5th Annual Report

CARE

Coordinated Accelerator Research in Europe

Integrating Activity

implemented as

Integrated Infrastructure Initiative

Contract number: RII3-CT-2003-506395

Project Co-ordinator: Roy ALEKSAN

Project website: http://care.lal.in2p3.fr/

Reporting period: from 01/01/2008 to 31/12/2008

Project funded by the European Community
under the "Structuring the European Research Area" Specific Programme
Research Infrastructures action

A. ACTIVITY REPORT

1. PROGRESS REPORT

1.1 Summary of the activities and major achievements

The CARE project includes three networking activities ELAN, BENE, HHH, and four joint research activities SRF, PHIN, HIPPI and NED. The fifth year of the project has permitted the following major achievements.

1.1.1 Networking Activities

CARE Management Activity

- Edition of the fourth CARE annual report (July 2007).
- Organisation of the CARE general meeting CARE'08 (CERN, Geneva, 2-4 December 2008).
- The CARE Management and Work Package Leaders have been actively involved in the preparation of the EuCARD bid to the FP7 Integrated activity call.

N1 Electron Linear Accelerator Network (ELAN)

- Participation to the preparation of EuCARD FP7 Integrating Activity project.
- Promotion of the CLIC-ILC collaboration both on detectors and accelerator systems.

N2 Beams in Europe for Neutrinos Experiment (BENE)

- Submission and approval of a neutrino related Work Package within the EuCARD FP7 Integrating Activity project.
- Begin of the International Design Study for a Neutrino Factory.
- Major milestone : MERIT validating design of hi power Li-Hg targets.

N3 High Energy High Intensity Hadron Beams (HHH)

- Participation to the preparation of 'Eucard' FP7 Integrating Activity
- Procurement of a pulsed dipole with curved shape for FAIR from INFN following development of fast-cycling superconducting magnet designs.
- Fourth scenario for the LHC luminosity upgrade based on lower emittance from upgraded injectors.
- Further development and partial testing with beam of novel electron-cloud mitigation methods (carbon coatings, black metals, mechanically or magnetically rough surfaces, low-impedance clearing electrodes, and wide-bandwidth feedback); launch of electron-cloud collaboration with the European Space Agency and its partners.
- Approval of experiment UA9 for crystal collimation of protons and ions in the SPS ring proper.
- Studies of advanced technological concepts for LHC, including crab cavities, long-range beam-beam compensation with high-temperature superconductor, crab-waist sextupoles, electron lenses and coherent electron cooling.

1.1.2 Joint Research Activities

JRA1 Superconducting Radio Frequency (SRF)

- Finalizing the improved cavity/Helium tank design for the coaxial and longitudinal tuner (WP2).

- Fabrication and testing of three 9-cell cavities made from large grain Niobium material (WP3).
- Testing of single cell cavities made from single crystal Niobium (WP3).
- Successful transfer of electropolishing technology to industry (WP5).
- Production and conditioning of new high power input coupler (WP7).
- Measurements of the improved emittance monitor in FLASH (WP11).

JRA2 Charge Production in Photo-Injectors (PHIN)

- SPARC: in the SPARC photoinjector the emittance evolution of the electron beam has been measured with Gaussian and square laser pulse longitudinal distribution. The two laser pulse-shaping system, the DAZZLER and liquid crystal mask, have been tested with very good results (WP3).
- CTF3: the PHIN photo-injector foreseen for the CTF3 Drive Beam has been completed on a dedicated stand-alone test bench (WP4).
- NEPAL: the present RF gun is called AlphaX gun and is temporarily installed waiting for the third PHIN gun which is under construction. The complete NEPAL beamline was completed in June 2008 (WP4).
- ELBE: in the operation period of the SC RF gun in 2008, optimization and measurements were carried out concerning the photo cathodes, the driver laser system, the cryogenic system, the RF system and the cavity parameters and the electron beam production and characterization (WP4).

JRA3 High Intensity Pulsed Proton Injector (HIPPI)

- Successful testing of the DTL prototype at CERN, which has allowed validating the construction technology and the novel drift tube alignment system (WP2).
- Completion of the design of the PIMS accelerating structure, solving the remaining design issues and launching the construction of a full-scale prototype (WP2).
- Completion of the measurements on the CH model and of the design of the full-scale prototype (WP2).
- Completion and vertical tests of Cavity B at CEA Saclay (WP3).
- Completion of the spoke prototype at FZJ, treatments at CNRS Orsay and successful measurement (WP3).
- Assembly of the chopper line at CERN (WP4).
- Benchmarking experiments completed at GSI, with improvements to the UNILAC machine (WP5).

JRA4 Next European Dipole (NED)

- The two Nb_3Sn strand manufacturers contracted by CERN to develop NED conductors are being producing the strand for the final strand delivery. SMI/EAS delivered to CERN 6.4 km of strand over a total quantity of 12.7 km.
- With a modified heat treatment, critical current density in the non-Copper part of more than 1500 A/mm^2 at 15 T and 4.2 K was obtained on the PIT strand, which has reached the specified target.

1.2 MANAGEMENT ACTIVITY

- The 2008 instalment received from the EC has been distributed to the CARE contractors.
- The CARE Web site http://care.lal.in2p3.fr/ has been regularly updated (CNRS-Orsay).
- The official table of the CARE deliverables has been regularly updated on the CARE Web site at http://care.lal.in2p3.fr/Deliverables .
- The CARE Publication Database has been maintained and updated (CEA).

- The following table lists all the management meetings as well as the general annual meeting CARE 08 organised by the management team.

Date	Title/subject of meeting	Location	Number of attendees	Website address
9-10 April 2008	CARE Steering Committee and Dissemination Board	CERN	15	http://care.lal.in2p3.fr/CAREmeetings/Management/Steering/Schedule/
17-18 September 2008	CARE Steering Committee and Dissemination Board	CERN	15	http://care.lal.in2p3.fr/CAREmeetings/Management/Steering/Schedule/
2-4 December 2008	General meeting CARE'08	CERN	113	http://care08.web.cern.ch/care08/
3 December 2008	CARE Governing Board	CERN	24	http://care.lal.in2p3.fr/CAREmeetings/Management/Governing/Schedule/
4 December 2008	CARE Steering Committee and Dissemination Board	CERN	15	http://care.lal.in2p3.fr/CAREmeetings/Management/Steering/Schedule/

1.3 NETWORKING ACTIVITIES (other than Management)

1.3.1 N1: Electron Linear Accelerator Network (ELAN)

ELAN is the CARE network for Electron Linear Accelerators. It comprises 11 countries plus CERN. The list of participants and their implication in the ELAN Work Packages (**C**: Coordination, X: Participation) is given in the table below. The overall management is done by CNRS-Orsay and CERN.

Number	Participant	LTECNC	LTECSC	BDYN	INSTR	ANAD
1	**CEA**		X	X	X	
3	**CNRS**	X	X	X	X	X
	CNRS-Orsay		X	X		
	CNRS-CPHT					X
	CNRS-LULI					X
	CNRS-LAPP	X			X	
	CNRS-LOA	X			X	X
	CNRS-LPGP					X
	CNRS-LPCO	X				
5	**DESY**		X	X	X	
7	**FZJ**				X	
8	**FZR**		X		X	
10	**INFN**	X	X		X	
	INFN-LNF	X			X	
	INFN-LNL		X			
	INFN-Mi		X			
	INFN-Na		X			
	INFN-Ro2		X			
11	**TEU**				X	
12	**TUL**		X			
13	**IPJ**		X			
14	**WUT-ISE**		X			
16	**CSIC**		X	X		
	CIEMAT		X			
	LEII		X			
17	**CERN**	X		X	X	
19	**PSI**				X	
20	**STFC**	X	X	X	X	X
21	**ICL**			X	X	X
22	**UMA**			X	X	

There are also associates:

Participant number	Organisation (name, city, country)	Short name	Associated to
1	**Center for the Advancement of Natural Discoveries using Light Emission, Yerevan , Armenia**	**CANDLE**	CERN
2	**Technion – Israel Institute of Technology,** Tel-Aviv, Israel	**Technion-IIT**	CERN
3	Stanford Linear Accelerator Center, **Stanford, USA**	**SLAC**	CERN
4	**Krakow University of Technology, (Institute of Applied Mechanics), Krakow, Poland**	**CUT**	CERN

N1.1 Meetings

- 9 workshops + 1 Accelerator school were supported by ELAN (~same as in 2007) as shown below
- This effort resulted in 11 ELAN Documents (23 in 2007)
- The ELAN web page contains all relevant informations about workshops and documents: http://esgard.lal.in2p3.fr/Project/Activities/Current/Networking/N2/ELAN/

Conclusions

A lot has happened on the LC project since ELAN started. Europe is in very good shape in this worldwide project and EU contracts have helped a great deal.

- ELAN has helped in connecting the various actors in particular CLIC and ILC
- ELAN has participated in the preparation of FP7
- ELAN financial resources (½ budget as initially planned) have been efficiently used to promote European participation to workshops

N1.2 Publications

See http://esgard.lal.in2p3.fr/Project/Activities/Current/Networking/N2/ELAN/Documents/

N1.3 Web sites

See http://esgard.lal.in2p3.fr/Project/Activities/Current/Networking/N2/ELAN/

N1.4 Activities of ELAN in 2008

ELAN proper activities were very limited in 2008 given that the management of ELAN is deeply implied in various organisations which have been developing fast during the ELAN period:

- R&D on SCRF technology is embedded within the **ILC**
- R&D on NCRF technology is within **CLIC/CTF3**
- Beam dynamics and Instrumentation is shared between ILC and CLIC
- Laser-plasma has migrated to **EUROLEAP**

Our role therefore has been to favour a strategy towards an e+e- collider at the European level through participation to workshops and by the preparation of FP7.

From **CARE** to **Eucard** and **ILC-Higrade**

A Complex process, first achieved through a bottom up approach, has led to a demand largely exceeding 10 M€ permitted by I3 EU contracts and has therefore been followed by a 'thinning' top bottom process very delicate to implement. Our role has been to help keeping alive the main ELAN components of CARE, including the laser-plasma aspect, and to make sure that things were kept as transparent as possible: both top bottom through **ESGARD** but also bottom up through a public discussion with the community which was held at CERN. There was no need to maintain ELAN in the new contract since the necessary networking in our field has been completed.
ILC-Higrade is one of the ~30 projects belonging to the roadmap defined by ESFRI. The participants are: CERN, DESY, France, Italy and the UK. This ILC project goes beyond most of the others in terms of its scope as a worldwide collaboration. The available resources will be used to define the various complex aspects of this enterprise from the European perspective but in tight connection with the GDE (Global Design effort on ILC):

- Governance, siting, outreach, lobbying…
- Financial support to improve the yield of cavities passing the 35 MV/m threshold (at present 50% of the XFEL cavities pass this requirement)

Status of ILC

There has been in 2008 a difficult financial situation in the US and the UK. However DOE and NSF intend to maintain their support at the level of 2007 (no step function).
Japanese (and Asian) interest remains firm (KeK in charge of assembling a full ILC SCRF station).
The new management of **CERN** (R. Heuer at LCWS08) states its intention to promote a worldwide LC (a meeting with FNAL and KeK managements has been announced). Recent progress on ILC R&D allows for an early decision ~2012 BUT ultimately LHC (or Tevatron) results will decide how to proceed. CLIC-ILC collaboration provides a common front on this strategy and is strongly encouraged.
The LCWS08/ILC08 workshop went through the various aspects of Physics, Detectors, Machine and their interfaces. The detector effort is now reaching a new degree of realism through 3 structured teams aiming at a complete detector description and evaluation also in 2012 (NB: >50% of detector resources are spent in EU with a noticeable help from **EUDET**)
ILC benefits from the construction of an **XFEL** at DESY with the industrialisation of ~1000 cavities. This provides a 'prototype' for ILC. Large scale infrastructures allow testing realistically the critical aspects: **ATF2** at KeK, **CesrTA** at Cornell and **TTF/FLASH** at DESY. Results on gradients are encouraging: 50% of the XFEL cavities (from one vender) pass the ILC 35 MV/m test (NB: this was a 2010 milestone !). Good micro-inspection tools explain failures. This R&D work is performed by 55 Institutes in 12 countries, including the emerging ones (India, China).

Status of CLIC

CLIC is a project aiming at constructing a multi TeV collider. It has recently modified drastically its parameters, in particular the frequency which went from to 30 GHz to 12 GHz. The parameter change was motivated by an optimisation of the overall project cost based on beam dynamics and accelerating structure considerations.
The R&D on CLIC is actively progressing through the CTF3 facility at CERN which is aimed at proving the feasibility of the 2 beam acceleration. Other research is the development and

testing of high gradient accelerating structures. This activity is performed in an international collaboration including SLAC and KEK. Assuming a successful R&D with CTF3 the project will propose a first phase at 500 GeV which directly challenges ILC, but the focus will remain on the high energy option. The objective is to produce a Concept Design Report by 2010.
Both projects share many common subjects and CLIC-ILC collaboration has materialized with the creation of 7 WG listed below. There was good cross-participation of ILC to CLIC08 and of CLIC to LCWS/ILC08. This corresponds to a 'Friendly rivalry' as recently stated by B. Barish in **Nature**.

ACTIVITIES of the WP

Work package 1: Normal Conducting Linac Technology (LTECNC)

No activity reported in 2008 (retired convener)

Work package 2: Super Conducting Linac Technology (LTECSC)

Title	Original end date	Estimated Status	Revised end date
Data Base for SCRF	July 2006	Integration into ILC GDE activities started, Test phase with DESY database has started	Current 2008

Work package 3: Beam Dynamics (BDYN)

The ILC-CLIC working group on beam dynamics identified a number of common issues. They contain questions of alignment and the design of the beam lines from the damping ring to the main linac. A specific problem is the potential of stray time-varying magnetic fields, while the acceptable level is different for ILC and CLIC it has been agreed to set up a common data base for measurement results.

Work package 4: Instrumentation (INSTR)
No specific ELAN activity reported in 2008
Work package 5: Advanced and Novel Accelerator Development (ANAD)
No specific ELAN activity reported in 2008

N1.5 Significant Achievements

- ELAN has participated to the delicate phases of the preparation of **Eucard**
- ELAN has been active in promoting the **CLIC-ILC collaboration** both on detectors and for the machine

- **N1.6 List of major meetings organized under ELAN during the reporting period**

2008		
CTF3 collaboration meeting	21-23 January	CERN
TILC08 Joint ACFA Physics and Detector Workshop and GDE meeting on International Linear Collider	3-6 March	Sendai, Japan
GDE Meeting	3-7 June	Dubna, Russia
ECFA2008 International Linear Collider Workshop	9-12 June	Warsaw, Poland
Posipol 2008	16-18 June	Hiroshima, Japan
CLIC 08 Workshop	14-17 October	CERN
2008 LC School Third International Accelerator School for Linear Colliders	19-29 October	Oak Brook, Illinois, USA
Channeling 2008	25 October - 1 November	Erice, Italy
LCWS08 and ILC08 International Linear Colliders Workshop 2008	16-20 November	University of Illinois at Chicago, USA
CARE08	2-4 December	CERN

1.3.2 N2: Beams in Europe for Neutrino Experiments (BENE)

BENE is the CARE network for Beams for European Neutrino Experiments[1]. It comprises 13 nodes. The table of the participants and their implication in the BENE Work Packages is given below.

Participant number	Participant	PHYSICS	DRIVER	TARGET	COLLECTOR	NOVEL NEUTRINO BEAMS
1	**CEA**	X	**C**	X	X	**C**
2	**UCLN**	X				X
3	**CNRS**	X			X	X
	CNRS-Orsay	X			X	X
	CNRS-LPNHE	X			X	
	CNRS-CENBG	X				
	CNRS-IPNL	X			X	
	CNRS-LPSC					**Cb**
	CNRS-IReS	X			**C**	
4	**GSI**					X
7	**FZJ**		X	X		
8	**TUM**	X				X
10	**INFN**	**C**	X	X	X	X
	INFN-LNF	X				X
	INFN-Ba	X				X
	INFN-Ge					X
	INFN-GS	X				
	INFN-LNL	X	X			X
	INFN-Mi	X				X
	INFN-Na	X				X
	INFN-Pa	**C**				X
	INFN-Pi	X				
	INFN-Tr	X				X
	INFN-Ro3	X				X
	INFN-To	X				
16	**CSIC**	X				
	UBa	X				
	IFIC	X				
	UAM	**C**				
17	**CERN**	X	X	X	X	**Cc**
18	**UNI-GE**	X		X	X	X
19	**PSI**			X		
20	**CCLCR**	X	X	**C**	X	X
	STFC-RAL	X	X	**C**	X	X
21	**ICL**	X		X		**Ca**

The overall management was done for the five years by INFN-Na. Our Deputy Coordinator (S. Pascoli, from Univ. of Durham, associated to ICL), in charge for the last two years after a

[1]BENE's mandate is that to promote clear awareness, in our particle physics peer community, a) the physics interest of superior accelerator neutrino beams (Superbeams, Betabeams, Neutrino Factories) b) the promising on-going developments of accelerator technology that will make them possible c) the opportunities that exist to plan, fund and realize, on a realistic time scale, a much enhanced European accelerator neutrino complex .

long vacancy, has finally managed to consolidate our dissemination tools and final list of publications. WP coordinators that had been replacing other colleagues during the lifetime of the NA completed their terms in full control of the PHYSICS (A. Donini, co-coordinator), DRIVER (M. Zito), TARGET (C. Densham) and COLLECTOR (M. Dracos) WPs and have finally taken, along with their colleagues, key responsibilities in the EUROnu DS.

After 2007 had been marked by the approval of the EUROnu DS proposal, **2008 recorded the approval, within** the new accelerator R&D IA **EuCARD** that will move on the foot-path of CARE**, of a number of initiatives related to R&D for neutrino beams.**

1) the **NEu2012** NA aiming at structuring of the accelerator neutrino community tighter than BENE has been able to. The name NEu2012 is meant to convey clearly the message that indeed the community of accelerator Neutrino users in Europe will meet the 2012 milestone recommended by CERN Council. When the concept of a future Eu neutrino facility, presently an emerging research infrastructure undergoing design study, will be revisited in the context of the particle physics section of the ESFRI road map.
2) **STFC-TA,** a Trans-national Access centred around the muon facility in advanced construction for the MICE (muon ionization cooling experiment) at the ISIS synchrotron at the Rutherford Laboratory in the UK
3) all the EuCARD **JRA's,** that are of
   -direct interest and involvement of the neutrino beams community, as for WP11 ANAC that includes **EUROFFAG**, R&D for Fixed Field Alternating Gradient accelerators of protons and/or neutrino parents or SRF WP10 including key R&D for the Superconducting Proton Linacs **SPL,** a superior (8 MW) option offered to and by Europe in the quest for the high power level indispensable for neutrino facilities and other high intensity science
   -interest for possible synergy with the upgrade of the Eu large collider LHC to **SLHC**. One is WP7, superconductive high field magnets SHFM (components in accelerators and in storage & decay rings of neutrino parents), another is WP8 COLMAT R&D on the behaviour in high power radiation environment of materials considered for LHC collimators (but also for high power targets producing neutrino parents and high power collection devices collecting them).
   -interest for possible synergy with the R&D towards more powerful electron **linear colliders**, like WP9 NRF doing R&D on normal conducting radiofrequency (applicable to muon ionization cooling) or again WP10 on superconducting radiofrequency (applicable in several sectors of both conventional and novel neutrino beams).

Started early in 2007, a long intense phase of preparation of this proposal involved several senior members of BENE. It was finally submitted 29 Feb 2008, with EUCARD requesting 15 M in total from EC.

In July **EuCARD was admitted to negotiation** with 14.5/15 marks and warned that a maximum EC grant of 10 M would be implemented for all IAs. Over the following few months a modified Proposal consistent with a grant of 10 M was prepared. Starting with a first negotiation meeting with EC on Jul 31 finally a full revised proposal (DoW= Description of Work) for the IA dated 6 Feb 2009, along with Grant Preparation Forms, was accepted by EC. The total cost will be 32 M. The budget of NEu2012 NA was reduced by 12% and that of TA-STFC by 25% (to approximatevely 280 and 222 KEuros, respectively).

The negotiations are completed and **the Grant Agreement is expected any moment.** The Consortium Agreement is meanwhile being finalized.
BENE has also given its contribution to another IA Proposal in in the particle detector sector. Known as **DEVDET** (development of detectors) and including Work Packages on neutrino detectors of great interest for neutrino beams, it scored a good mark but not so high to be admitted to negotiations. Other initiatives must be therefore launched to support this R&D sector, just as essential as accelerator R&D.

The approval of the neutrino beam related packages in EuCARD is the last contribution of BENE to the future of its sector. Like the approval of EUROnu, it does follow from the recognition of the strategy indicated by BENE, including its attention to international collaborations in a truly global context, by CERN Council in its Strategy Document issued in July 2006 in Lisbon. That turned the present plans of a new more powerful accelerator neutrino complex into those of an emerging facility of EU interest, in the context of the ESFRI road map.

BENE's legacy is now entrusted to **EUROnu** (Sep 1 2008-2012) and to **NEu2012** and the other activities in EuCARD (Apr 1 2009-2013)

We hope that they will both be strongly supported by European agencies in the coming years. They **must match the 2012 (or 2013) milestone set for us by Council**.

The year 2012 was set by Council as the milestone for evaluation of the next major Eu undertaking in the accelerator neutrino sector. Studies of the scientific case for future neutrino facilities and the R&D into associated technologies are required to "*be in a position to define the optimal neutrino program based on the information available in around 2012*". **The effort of BENE and its FP7 off-springs is in that prospective.**

The process of this evaluation is indeed being set up. Long requested by BENE, appropriate **oversight bodies are finally coming in place**.

The **Strategy Secretariat** of CERN Council has started for 2009a series of interviews meant to provide an overview of the ongoing and possible future neutrino activities where European involvement exists or is planned. The first interview was held on Jan 26 jointly with EUROnu and EUCARD (NEu2012), both already on the list of Recognized Projects of the European Strategy.

Council also asked the CERN SPC to set up a panel to look at CERN's possible involvement in future neutrino facilities and report to its December 2009 session. This **SPC neutrino panel** (chaired by A: Zalewska, with Aleksan, Blondel, Dornan, Meier and Zwirner) is already at work to provide its views on
- the importance of precise measurements of the neutrino oscillation parameters, in particular the CP violating phase and mass hierarchy
- the overall value of the International Design Study of neutrino factories for the future of the subject. Should CERN take a more active role in enabling the study to reach its goals, irrespective of where such a facility would be sited?
- what other high intensity neutrino facilities are technically possible and how would they address the measurements above, what should be the involvement of CERN in studies of these facilities, in particular with regard to the planned LHC upgrades

- on the merit of a European strategy in this phase of neutrino experimentation and whether it should have a place on the future CERN road map

The time scales of the two reviews are being organized in such a way to exclude unnecessary iterations of discussions.

A dedicated workshop on the themes of the SPC neutrino panel is being organized **in September 2009 at CERN**. It **is the opportunity for our community to expose** in depth, to front of the SPC and Counci**l, its** scientific and technical **case. As it stands today, in view of 2012.** .

2012-3 is indeed the appropriate time: solid physics results should have come from LHC, giving general direction to particle physics, and from the T2K and Double-CHOOZ experiments, giving great guidance to identify the optimal step in the exploration path of neutrino transitions. Meanwhile financial resources will be liberated by the end of the payments for LHC and its detectors. Major decisions will be mature, for ILC, for accelerator neutrino and for other sectors. The deadline must be met.

In order for that to be even conceivable, there is no doubt that a CERN neutrino task force must be put again in place. Discussions have been reopened with the new CERN Management, finding it open to consider the option. A mandate for such a CERN force is presently being drafted.

The Network that will replace BENE, NEu2012, is indeed meant to integrate exactly with such a CERN team. Support from EC is requested for Geneva-based postdocs that will both power the network and be the kernel of a collaboration of national teams from the community and CERN

FP7 business was very intense for most of the year. Only in the last part of it, BENE switched finally the focus of its attention **to the** preparation of its final meetings at CARE08 and its final reports.

In addition to this strong focus on FP7 proposals, during 2008 the BENE Network has

a) **monitored the physics results** of the neutrino experiments in progress **and their implications** for the directions of the field**.** 2008 did not register any major results. MINOS consolidated its confirmation of the atmospheric transitions and improved the current uncertainties on the neutrino parameter governing them. Most interesting result of the year was of phenomenological nature: a few independent global analysis of the solar, atmospheric and accelerator **data** all **favour a non zero**, order 1%, value of the so far undetected $\sin^2$ of the third mixing angle θ_{13}, essential for the 3*3 mixing matrix scenario to be established. Driven by the SNO nucleon detector data, this is by no means a proof, thou exactly what you expect if nature had chosen a $\sin^2 \theta_{13}$ close to our current sensitivity to a non zero value.
b) **followed closely progress of the CNGS, the present flagship of Eu accelerator neutrino physics:** The CNGS Run in 2008 provided $1.78 \cdot 10^{19}$ pot (protons on target). Still below the $4.5 \cdot 10^{19}$ pot/year target, 2008 must be however heralded as the first real continued physics production run. The neutrino target "bricks" of the OPERA experiment by now all operational, in the Gran Sasso gallery 732 Km away, this is not far from the average number of pot ($2 \cdot 10^{19}$) expected to yield one detected ν_τ

appearance event. The first of the handful that should confirm the favored $\nu_\mu \rightarrow \nu_\tau$ interpretation of the ν_μ disappearance phenomena established so far. Waiting for candidates, a first sample of precious ordinary events has been collected and analyzed by OPERA.
A major effort during the shutdown implemented the necessary solutions (additional shielding and rearrangement of the electronics) to the radiation problems that cut the 2007 CNGS run short. On the side, this triggered a large campaign for rad-hardness for LHC, making the CNGS also a test bed for parasitic irradiations of interest for LHC and others. It was also possible to understand the puzzling asymmetry of neutrino and antineutrino profiles as due to the action of the earth magnetic field along the unprecedentedly long (up to 1 Km) flight of pions before decay. 2009 should be the year of full CNGS intensity. The challenges will be maintaining a favorable duty cycle to the CNGS and implementing successfully multi-turn extraction from the PS in the SPS.

c) **mantained interest in the studies of the ultimate performance of the CNGS.** No major news, here. The ICARUS group[2] has been progressing towards operation of its 600 Tons Li-Ar device, decisive milestone before seriously conceiving of a new much larger Li-Ar detector module and a new underground detector hall. Solid studies of the maximal long term CNGS performance, when the new LHC injector chain will be in place, have already been done by the CERN/AB CNGS team and further analysis will accompany the build up of attractive concrete experimental options based on LiAr or other techniques.

d) **followed closely the progress of the EU Team in the T2K experiment in Japan,** a CERN recognized experiment (RE13), with a regular MoU[3]**.** This is a large team of about 150 physicists, a key community for future neutrino facilities in Europe **along with the smaller EU teams working in the Fermilab** neutrino beams. It is contributing major components of the T2K near (280m) detector. The refurbished European NOMAD (former UA1) big magnet is now installed at JPARC and so is a first sector of the TPC. The JPARC neutrino beam schedule, with contributions from RAL and Saclay, is progressing with the usual Japanese rigor. Europe is **contributing** to T2K **also** by measuring hadro-production of neutrino parents in the proton energy region of interest for T2K, by means of **a few dedicated runs of the NA49 CERN detector, approved as NA61/SHINE**, on a secondary SPS 40 GeV proton beam. NA61 has geared up to collect data 10 times faster than NA49. The 2008 run was cut short due to the LHC accident.

e) **followed closely the last year of the Betabeam DS,** a task of the Eurisol DS that will soon draw its conclusions in the DS final meeting late in March 2009 on the original betabeam concept. This is based on a storage ring filled by the present SPS with low Q value He (anti-ν) and Ne (ν) ions produced by the EURISOL front end and pointing to the Frejus site. The necessary production rate (2.9 anti-ν and 1.0 ν, in units of 10^{18}/year) is still not in sight, especially for ν, and **alternative production schemes must be investigated**. Further studies on radiation and heat deposition issues have given comforting results, a PS experiment on decay ring stacking was successfully done and the beneficial addition of an accumulator ring studied. The EURISOL

[2] LOI for a new very massive modular Li-Ar Imaging Chamber to detect low energy off axis neutrinos from the CNGS beam (22/12/2006) and Proccedings of the second CryoDet Workshop, Gran Sasso, June 2007

[3] Memorandum of Understanding CERN/T2K, 24-Nov-2006

scenario will serve as reference for further studies and developments in the betabeam WP of the EUROnu DS.

f) **followed the evolution of R&D projects** in progress, **in Europe**, with much scientific, technical and organizational work done by BENE members in several R&D collaborations

g) **a) HARP** data analysis, still providing more decisive hadro-production data
b) the **HIPPI** design work of LINAC4 and by now the first steps of its construction
c) MICE progress, marked by the installation of most of the detectors in the muon ionization cooling test facility in construction at RAL
d) MERIT analysis of the data taken late in 2007, with a (single) CERN PS proton bunch comparable to the one foreseen at future higher power facilities; a major step forward in the validation of the concept a multi MW liquid metal jet target with a solenoidal collection system
e) EMMA, the first non scaling FFAG demonstration electron model machine, in preparation in Daresbury, that will be equipped in the frame work of the ANAC EUCARD JRA with an appropriate diagnostic system

as well as outside Europe, where also some work has been contributed by BENE members

f) emerging **upgrade programs of the Fermilab NuMi** (Neutrino from the MI, the Main Injector) conventional **pion decay** neutrino **Facility**, admittedly decisive for the future of that laboratory. The NOνA project, complementary to T2K for its sensitivity to matter effects, appears on the way to approval on the present **NuMI** line heading **North**. A new longer baseline **NuMI** line heading **West** towards the now approved DUSEL (Deep Underground Science and Engineering Lab) site at Homestake, SD, is now in advanced phase of study. Both lines are expected to benefit by an independent project, **Project-X**, a new 1 MW proton driver, a 8 GeV ILC like linac, that could bring about 2.3 MW at the 120 Gev of the MI, opening a path to super neutrino beams and other high intensity experiments.
g) longer term **studies, always at Fermilab, of muon decay neutrino beams,** coupled to even longer term plans for a high energy frontier Muon Collider: truly a muon based vision for the future of the Lab, the push for Project-X and its upgrade path to 4 MW being decisive part of it. FNAL, LBL, BNL assemble many other labs, universities and research companies. A US Neutrino Factory & Muon Collider Collaboration **NFMCC** has been active since 1998, getting the MUCOOL and MICE projects on their way, building and exploiting the Fermilab Muon Test Area MTA for components of a muon ionization cooling channel, animating the International Design Study and the Scoping Study that came earlier. By now, Fermilab has its own Muon Collider Task Force **MCTF**, that in strict coordination with the NFMCC, has now produced a 5-years-plans for future activities. A first stage low energy (4 GeV muons) neutrino factory is an element of the plan, with design report by 2012 and construction starting before 2020.
h) the Japanese fast progress in the construction of the **T2K facility** and the slower planning a Japanese muon facility **PRISM** that may evolve into a neutrino factory (**NuFactJ**).

h) **contributed to all the few most important international events of the year:** -the late winter **Rencontres de Moriond** and Rencontres **de la Thuile -Neutrino 2008,** XXIII International Conference on Neutrino Physics and Astrophysics in Christchurch New Zealand, May 25-31, the main event in our field - **PAC09,** the 11th European Particle Accelerator Conference, Genoa**,** 23-27 June - **ICHEP 34th Conference** on High Energy Particle Physics in Philadelphia, July 29 -the **CARE08** and **BENE08 Workshops** at CERN in December and more, re-proposing updates on BENE basic strategy to aim at a Conceptual Design Report of a new ν-complex by 2012, advocating a timely R&D program and recommending participation & commitment to the BENE FP7 projects .

i) **contributed to its two main traditional yearly appointments.** A large BENE delegation was present to both meetings -**NuFact08**, June 30-July 5, the 10th annual International Workshop on Neutrino Factories, Super beams and Beta beams, in Europe again after the traditional 3 years turnation, organized in Valencia by the Spanish node of BENE. This is the yearly international forum of a world-wide collaboration of several regional communities and has gained importance over the years, providing every year the most advanced review of the potential of both conventional and novel neutrino facilities. The BENE community has been presenting the work of one year giving a large fraction of the talks given in all parallel and plenary sessions of the workshop. The workshop had been preceeded in Benasque in June by its accompanying summer school

-**NNN08**, 11-13 October, in Paris, organized by the IN2P3 node of BENE, the eigth in a series of NNN workshops, very similarly, a yearly international forum of a world-wide collaboration of several regional communities, reviewing the physics case and the technical of Next very large mass underground Neutrino and Nucleon decay detectors and structuring the international collaboration towards their realization. It assembled updates on the plans for a large Megaton water detector in Japan (Hyper-Kamiokande and its variants), at DUSEL in the USA, in the Frejus site in Europe, those on large Li-Argon tanks now under development in Italy, where it began, and now in Switzerland, US and Japan and those on large liquid scintillator tanks.. The BENE community has been presenting a significant fraction of the talks

j) **been continuing its contributions to the relevant debate on the evolution of the CERN proton complex,** moving now from ad-hoc task forces like PAF (proton accelerator of the future) and POFPA (physics opportunities of those future proton accelerators), more directly to the Directorate, SPC and Council. A. Blondel and P. Dornan have remained our voices in the CERN SPC. The appointment of a SPC neutrino panel is a major result of this effort..

k) **contributed to the start of the NF-IDS**, rooted in the Scoping Study launched under BENE auspices in NuFact05 in Frascati and completed, by now. The NF-IDS, International Design Study, http://www.hep.ph.ic.ac.uk/ids/ focusing on the Neutrino Factory with the basic strategy to aim at a Design Report of by 2012 or so, structured in a Accelerator Design, Detector Design and Performance Evaluation task forces., has produced relevant work reported at two plenary and several smaller meeting in 2008. Eu contribution is being now enhanced by the onset of the FP7 EUROnu DS.

l) **been revisting possibilities of establishment of a detector R&D effort,** mandatory for the achievement of our goals, after the set back of the DEVDET project. A new workshop of the Golden07 series, First International Workshop on the Golden Channel at a Neutrino Factory, is being organized for 2009. Magnetised Iron Neutrino

Detector (MIND) of the MINOS type, Totally Active Scintillation Detector (TASD) of the NOvA type, Magnetized Emulsion Cloud Chambers (MECC) remain the main options being investigated.

m) **contributed to the organization of the 3rd International High-Power Target Workshops** organized in Oxford 1-2 May and in Princeton 6-7 November. The High-Power Targetry Workshop brings together interested scientists and engineers from the international community. In particular scientist from the major high-energy laboratories in the US, Japan and Europe are addressed. Subject matter of the workshop focuses on problems and solutions for targetry utilizing MW class future accelerators. Both high average power and high peak power issues are explored. For the third workshop, the organizing committee had decided to focus on future activities which will lead toward successful implementation of targets for proposed new multi-MW class proton drivers.

n) **organized during** the annual **CARE08** http://care08.web.cern.ch/care08/meeting. **its yearly BENE08 Workshop** http://bene.web.cern.ch/bene/BENE08agenda.htm. Its presentations reviewed extensively the achievements of the year in Europe and elsewhere listed above. First discussions of the plans of implementation of our approved EuCARD initiatives took also place.

o) **started following, since Sep 1, the first steps of the EUROnu DS** that will face the key technical challenges and produce conceptual designs and cost estimates of the three currently accepted methods of realizing a new neutrino facility. An SPL based superbeam on the CERN-Frejus baseline will be studied. In the Neutrino Factory sector, it will be also our contribution to the above mentioned International Design Study with America and Asia: a decisive collaboration being the one with the US Neutrino Factory Collaboration and the Fermilab Muon task force. In the betabeam sector scenarios beyond the EURISOL DS (different higher Q value ion decays, different production schemes, ion acceleration to higher Lorentz gamma factors for longer neutrino flight paths) will be investigated. Using the available information baseline detector option best suited to measure physical quantities governing neutrino oscillation parameters, it will make a comparison of the physics reach of these facilities.

p) **been starting preparation of the NuFact09 and NNN09** Workshops, again crucial appointments of the year, both in USA in 2009, in July and October respectively.

N2.1 Meetings

The major events organized (or co-organized) and supported by BENE or some of its nodes in 2008 were:

2 The first-meeting of the IDS-NF, the International Design Study on Neutrino Factories at RAL 16-17 January.

3The **kick-off meeting of EuroNu** Governing Board and Steering Group at CERN on Feb 5 at CERN, that life proved somewhat premature. Though useful nevertheless, S. Myers accepted there the chair of the GB. BENE matching funds in some of the national labs were used for the meeting.

4High Power Target Workshop in Oxford 1-2 May,

5 http://www.physics.ox.ac.uk/users/peachk/HPT/Talks.htm

6Second IDS meeting in June at Fermilab https://www.ids-nf.org/wiki/FNAL-2008-06-10, http://www.hep.ph.ic.ac.uk/ids/communication/FNAL-2008-06-10/index.html

7The NuFact08 Summer school, **7th International School on Neutrino Factories, Superbeams and Betabeams,** http://ific.uv.es/nufact08/school/index.html, held in Benasque and Valencia, Jun 9-27 coupled yearly to the NuFact07 Workshop, with the aim of the school is to provide young particle physicists with an introduction to both particle and accelerator physics aspects of conventional and novel neutrino beams.

8**NuFact08,** Valencia, http://ific.uv.es/nufact08/ the 10 th International Workshop on Neutrino Factories, Superbeams & Betabeams, June 30-July 5.

9**FFAG'08**, the yearly FFAG international meeting, back to Eu for the third time, 1st-5th September 2008, University of Manchester Physics Department, Oxford Road, Manchester, http://www.cockcroft.ac.uk/events/FFAG08/programme.htm

10The 7th International Workshop on Next Nucleon decay & Neutrino, **NNN08 , Paris** 11-13 October, http://nnn08.in2p3.fr/

11**High Power Target Workshop** in Princeton 6-7 Nov.,

12 http://www.physics.princeton.edu/mumu/target/

13organized during the annual CARE08 http://care08.web.cern.ch/care08/meeting., **the yearly BENE08 Workshop** http://bene.web.cern.ch/bene/BENE08agenda.htm.

At the WP level, it felt wise to limit dedicated meetings, in addition to the BENE meetings, the many plenary and parallel meetings of the IDS and the proliferating multiple international appointments.

Phone-meeting had long since become our common practice to prepare the major events.

BENE has also made reports at regular ECFA meetings in the year. It also kept regular contact with the Chairs of the CERN scientific committees (SPSC, SPC) and the CERN Directorate.

N2.2 Publications

An overview of BENE documents and publications can be found in:
http://bene.web.cern.ch/bene/publications/
From there one can link to the documents created by each work package. They are structured in the same way as it is proposed for the general CARE publication policy, i.e. CARE-Note/Report/Conf/Pub/Document.
Regular update of the database of publications by the work package convenors and the BENE deputy coordinator , previously hindered by the lack of a deputy coordinator, has finally been tackled. A full list of BENE publications is now available and appended to this document.

N2.3 Web Sites

The BENE Main Web Page http://bene.web.cern.ch/bene/.has achieved its final shape and will be the model for the one of NEu2012

It displays the general plan of BENE activities for about 1 year ahead. Basic informations are kept up to date. BENE federates several pre-existing working groups and relies on their several pre-existing Web sites
http://muonstoragerings.web.cern.ch/muonstoragerings/Welcome.html
http://nfwg.home.cern.ch/nfwg/nufactwg/nufactwg.html
http://beta-beam.web.cern.ch/beta-beam/

The process of re-organization into a unitary site, in tune with the BENE federative process ,was completed. In most BENE WP Web page, the fraction of the material relevant to the scope of WP was reorganized in a coherent set of links.

The Mailing List of members, bene@cern.ch, has been further extended. In addition there exist mailing lists of each work packages. (hep-mgt-betabeam@cern.ch, hep-mgt-bene-collector@cern.ch, hep-mgt-bene-drivers@cern.ch, hep-mgt-bene-muend@cern.ch, hep-mgt-bene-mufront@cern.ch, hep-mgt-bene-physics@cern.ch, hep-mgt-bene-target@cern.ch). Other lists of more loosely connected colleagues are also maintained.

N2.4 Activities of BENE in 2008

Perhaps the best summary of the technical achievements stimulated this year by BENE is the list of presentations, in part supported by BENE funds, made by EU speakers at the two main yearly events of interest for BENE: NuFact08 and NNN08.

Plenary presentations at NuFact08 included:
Physics of massive neutrinos (C. González-García), Optimisation of future neutrino oscillations experiments (O. Mena) Detector R&D for future neutrino oscillations facilities (P. Soler), Beta beam R&D status (E. Wildner), Results and lessons from the operation of current beams for neutrino experiments (E. Gschwendtner), Neutrino interactions with nuclei (U. Mosel), The scientific case for muon physics at a neutrino factory (S. Davidson), Status and prospects for hadron production experiments (G. Catanesi), Synergies between neutrino physics and collider physics (A. Pilaftsis), Prospects for mass scale and inverted hierarchy in non oscillations experiments (S. Pascoli), Status and prospects for reactor experiments (D. Lhuillier), What cosmology can tell us about neutrino physics in the next 10 years? (S. Pastor), Oscillations WG1 Summary (P,Hernandez), Accelerator WG3 Summary (M. Meddahi), Muon WG4 Summary (F. Gatti). Many more WG (parallel) presentations are to be counted in addition.
Plenary presentations at NNN08 included:
Proton decay and neutrino astrophysics with the future LENA detector (T Marrodán Undagoitia), Current understanding of core-collapse supernovae and neutrino emission (H.T. Janka), A process to detect neutrinos of vanishing kinetic energy by means of unstable target nuclei (M. Messina), Possible CP-Violation effects in core-collapse Supernovae (J. Gava), Theoretical models of neutrino parameters (G. Roos), HARP / NA61 (B.Popov), Super Kamiokande latest results (M. Fetscher), Characterising the T2K neutrino beam: Status of the T2K Near Detectors (L. Kormos), ICARUS T600 (S. Centro), Borexino (F. von Feilitzsch), DOUBLE CHOOZ and RENO (T. Lachenmaier), European neutrino beam plans (P. Soler), LAGUNA (T. Patzak), ANTARES, lessons learned from its completion (T. Eberl), Water Cherenkov R&D in Europe (A. Tonazzo), R&D plan towards 100 kton LAr detector (A. Marchionni), MODULAR (F. Pietropaolo), R&D Scintillators in EU (C. Buck), PARISROC

(G- Martin-Chassard), Massive PM production by Photonis (B. Combettes), A low energy neutrino factory with non-magnetic detectors (T. Schwetz-Mangold), Geoneutrinos (G. Fiorentini), Pre-feasibility study at Pyhasalmi (G. Nuijten), Large underground cavities in a salt mine from Slanic-Prahova, Romania (R. Mircea Margineanu).

BENE's initiative in 2007 was driven by the work of its Steering Committee that created the necessary networking tools for this and organized the main meetings and the other events. Regular phone-conferences are the main tool of coordination in the interval between meetings. Closed or Open meeting of the SG in person occur then at each of the major events that BENE supports.

The BENE SG was the core of the editorial board of all our FP7 proposals

The following text and five tables highlight the progress of work done by each work package by listing the lowest level subtasks of the BENE detailed implementation plan. No major deviations are reported, with one notable exception in the driver sector (see below, as already remarked in the two last yearly reports, the choice of a proton driver is postponed and discussed in the much wider scope of CERN long term plans).

All WP s have had regular phone-meetings over the year.

WP1 (PHYSICS) During 2008 one of the major improvements in the understanding of the physics reach of future neutrino facilities have been the studies about new physics discovery potential and sterile neutrino detection at the Neutrino Factories. Several papers have been published about this subject: A. Donini, K.i. Fuki, J. Lopez-Pavon, D. Meloni and O. Yasuda,``The discovery channel at the Neutrino Factory: nu_mu to nu_tau pointing to sterile neutrinos", arXiv:0812.3703 [hep-ph]; W. Winter,``Testing non-standard CP violation in neutrino propagation", Phys. Lett. B 671, 77 (2009) [arXiv:0808.3583 [hep-ph]]; J. Kopp, T. Ota and W. Winter, ``Neutrino factory optimization for non-standard interactions" , Phys. Rev. D 78, 053007 (2008) [arXiv:0804.2261 [hep-ph]]; M.B. Gavela, D. Hernandez, T. Ota and W. Winter, ``Large gauge invariant non-standard neutrino interactions", Phys. Rev. D 79, 013007 (2009) [arXiv:0809.3451 [hep-ph]]; S. Antusch and E. Fernandez-Martinez, "Signals of CPT Violation and Non-Locality in Future Neutrino Oscillation Experiments", Phys.Lett.B665:190-196,2008[arXiv:0804.2820 [hep-ph]]; andS. Antusch, J. P. Baumann, and E. Fernandez-Martinez, "Non-Standard Neutrino Interactions with Matter from Physics Beyond the Standard Model", Nucl.Phys.B810:369-388, 2009 [arXiv:0807.1003 [hep-ph].

The overall optimization of a green field beta beam setup, analyzing the synergies between 8Li-8B and 6He-18Ne setups and looking for other possibilities, has been widely studied in several papers: A.~Donini et al.,``Determining the hierarchy of neutrino masses with high density magnetized detectors at the Beta Beams", AIP Conf. Proc. 981 (2008) 181; W.~Winter, ``Optimizing the green-field beta beam: Small versus large theta_13", arXiv:0809.3890 [hep-ph]; S.K. Agarwalla, S. Choubey, A. Raychaudhuri and W. Winter, ``Optimizing the greenfield Beta-beam", JHEP 0806, 090 (2008) [arXiv:0802.3621 [hep-ex]]; D. Meloni, O. Mena, C. Orme, S. Palomares-Ruiz and S. Pascoli, ``An intermediate gamma beta-beam neutrino experiment with long baseline", JHEP 0807, 115 (2008) [arXiv:0802.0255 [hep-ph]].

A very interesting study compared the different facilities, beta beams, neutrino factories and super beams, under the hypothesis of large values of theta(13) (large enough to be detected by the Double Chooz reactor experiment). This study concluded that are possible "simple" beta

beam configurations that could complete in one step the whole mapping of the neutrino mixing matrix: W.~Winter,``Minimal Neutrino Beta Beam for Large theta_13" Phys. Rev. D 78, 037101 (2008) [arXiv:0804.4000 [hep-ph]].

Also new Neutrino Factory setups have been recently developed. One interesting possibility is to use a not magnetized water Cerenkov detector as a neutrino factory detector. It could have an appreciable physics potential as delineated in P.~Huber and T.~Schwetz,``A low energy neutrino factory with non-magnetic detectors", Phys. Lett. B 669, 294 (2008) [arXiv:0805.2019 [hep-ph]].
A second setup is a low energy Neutrino Factory that could be a cheaper and faster to build facility in case theta(13) is large: A.~Bross, M.~Ellis, S.~Geer, O.~Mena and S.~Pascoli, ``The low-energy neutrino factory", AIP Conf. Proc. 981, 187 (2008).

The overall progress of the measurements of the neutrino oscillation parameters have been continuosly monitored. In 2008 the major development has probably been the first hint of a non-zero theta(13) value coming from the fits to the solars parameters: M.~Maltoni and T.~Schwetz, ``Three-flavour neutrino oscillation update and comments on possible hints for a non-zero theta_{13}", arXiv:0812.3161 [hep-ph]; T.~Schwetz, M.~Tortola and J.~W.~F.~Valle, ``Three-flavour neutrino oscillation update", New J.\ Phys.\ {\bf 10}, 113011 (2008) [arXiv:0808.2016 [hep-ph]].

WP2 (DRIVER) has continued to monitor the developments in the field of proton drivers. There has been significant progress during the past years in the definition of CERN future proton accelerators. The first stage of implementation (Linac4) is taking place. The preparation of detailed project proposals for the second stage (LP-SPL and PS2) is approved (deadline: mid-2012). The High Power version of SPL has also been studied at the CDR level and with 4 MW of beam power it offers a unique potential for neutrino physics in Europe both for SuperBeams and for a Neutrino Factory project. Clearly the BENE network should continue to closely follow these promising developments and provide input to optimise the physics potential for neutrinos of the proton accelerator complex at CERN.

Concerning the question of the optimum energy of the proton driver in terms of pion production in a target, the newly published data (Eur. Phys. J. C 51 787 2007 and Eur. Phys. J. C 54 37 2008) from the HARP experiment provide a crucial piece of new information. The first studies suggest that this optimum energy is in the 4-6 GeV range. This is considerably lower than indicated by previous investigations (e.g. RAL-TR-2007-23). A detailed implementation of this rich new data set in simulation tools is an important task that this WP has contribued to emphasize and will be carried out in the FP7 framework.

A few years too late, on the BENE time scale, the decision on a proton driver is approaching. A moderate energy, 5-8 GeV, MMW power linac is emerging as most adequate and preferable by neutrino experts on both sides of the Atlantic and getting more and more the support of the community.
A first workshop in May 2009 at CERN will debate, among other things, the potential of the new LHC injectors for non LHC physics. EUROnu and NEu2012 will be advocating that in the upcoming first set of decisions in 2010-11, the option of MMW (multi mega watt) power at CERN is left possible.
The above mentioned September workshop, dedicated explicitly to longer term neutrino

plans, will then permit to develop the complete scientific and technical case for MMW power sources: for conventional (super)beams and novel betabeams and neutrino factories. Well before the larger scope statements expected in 2012 these issues have to be clarified to the level necessary to make decisions possible.

Finally, a good part of the activities in this WP has been devoted to the preparation of the FP7 proposal of the EuroNu design study. In this context, new energies from RAL and Saclay have been attracted to the BENE framework. Thanks to the active role of the BENE framework a strong european collaboration was formed and an important fraction of EuroNu resources will tackle the most difficult aspects of an SPL based SuperBeam project. Clearly this design study will provide an excellent focussing point for the studies related to the proton driver.

WP3 (TARGET) There have been significant achievements this year, particularly from the team directed at RAL by the WP coordinator, both in terms of technical achievements and also in terms of international co-ordination. With regard to the first of these:
(1) The T2K beam entry window, pion production target and associated components were successfully integrated into the Target Station at JPARC, Tokai, by the RAL T2K team and are ready for first beam on 1st April 2009. In addition, a remote target exchange system was designed built and commissioned with the result that failed targets can be easily replaced within the 1st magnetic horn. A valuable technology of inflatable vacuum seals was acquired and developed, which would be of use in a future neutrino facility target station.
(2) A flowing powder target plant was fully commissioned at RAL, including a complete recirculation and control system thereby enabling experiments to be carried out into the application of this innovative technology to a pion production target system.
(3) An international team has continued the interpretation of the results of the MERIT experiment at CERN, of pulsed proton beam interactions with a mercury jet in a solenoidal magnetic field.
(4) Shockwave studies of thin tungsten wires have continued at RAL.
(5) UK involvement has been initiated in the US led Spallation Neutron Source led programme into the mitigation of Cavitation Damage Erosion.

International co-ordination has developed into a new phase, with various strands of endeavour in high power targets for neutrino facilities being aligned with overlapping programmes. A number of meetings were held over the year on targets for future neutrino facilities, including two Oxford/Princeton High Power Target workshops, culminating in a EUROnu/NF IDS targets joint kickoff meeting held at CERN 15-16 December.

WP4 (COLLECTOR): The new idea (already emerging last year) of using a group of 4 horns and targets has been further investigated mainly to define the proton beam implications and system feasibility. This system has the advantage to increase the lifetime of the system and allows the utilisation of solid targets (e.g. carbon) much easier to handle than liquid targets (e.g. mercury). In this new scheme, the 4 MW proton beam will be sent alternatively to the 4 horn/target systems with a reduced frequency of 12.5 Hz instead of 50 Hz for each horn/target system. Interaction with proton driver experts has already started to make a preliminary design of the necessary 4 beam-lines and study the way to extract the beam from the accumulator/compressor and send it to these lines.
New studies and simulations have started taking into account the 4 horn/target system in order to optimize the neutrino flux and energy spectrum at the level of the neutrino detector. These studies will continue in the framework of the EUROnu FP7 DS project.

WP5a (MUFRONT) has been active this year in the following sectors :
1) the commissioning of the instrumentation for the international Muon Ionisation Cooling Experiment (MICE) at the Rutherford Appleton Laboratory (RAL) and of the MICE Muon Beam itself that has been going over the past two years or so. Particles were first transported along the beam line in March 2008. Over the course of the year, the time-of-flight counters, the Cherenkov detectors, and the first section of calorimeter were all commissioned. In December, an understanding of the problems with the decay solenoid that had plagued the experiment throughout the year was developed and a repair plan instigated. The infrastructure in the MICE Hall is now essentially complete and it is expected that the remaining problems with the decay solenoid will be overcome in the coming months. It is planned to implement an improved design for the MICE target over the course of the summer so that data taking can resume later this year when the first spectrometer solenoid will be at RAL. The experiment will then be constructed with a view to delivering a demonstration of ionisation cooling in time for the 2012 decision point on the future direction of neutrino physics in Europe that was identified by the Strategy Group of CERN Council.

2) the launch of the FP7 Design Study EUROnu, a significant achievement in the course of 2008. The development of the conceptual design for the muon front end of the Neutrino Factory has continued within the context of the International Design Study for the Neutrino Factory and EUROnu. BENE WP5a personnel are playing leading roles in this work leading the IDS-NF subtasks and work packages within EUROnu. Novel designs are being considered for the cooling channel. The designs are motivated by the need to reduce the magnetic field on the surface of the accelerating cavities to allow the desired accelerating gradient to be achieved. Work has also progressed on the muon linac and the recirculating linear accelerators (RLAs) as well as on the muon FFAG. In the case of the linac and RLAs the work has focussed on the development of tracking algorithms and in the case of the muon FFAG work has begun on the kicker concept.

WP5a physicists have continued to give presentations on MICE and the other activities at a number of international meetings and workshops, including the International Neutrino Factory, beta-beam, and super-beam Workshop (NuFact08) in Valencia, Spain, in July and the CARE08 meeting in December. .

WP5b (MUEND) has been promoting in 2008

- design studies concerning scaling FFAG lattice, magnet and acceleration, and their application in a proton ring,

- code developement concerning the muon FFAG accelerators, regarding beam dynamics, simulation of defects, design optimizations.

- collaboration with EMMA and PAMELA in the UK, including organization of two mini-workshops “Zgoubi” - FFAG beam-dynamics simulation tool

- participation in EMMA - phone meetings (about every 2-3 weeks), code development, preparation of the commissioning of the EMMA ring

- participation in RACCAM design study, all details available at http://lpsc.in2p3.fr/service_accelerateurs/raccam.htm. These studies are performed in collaboration with the ISS accelerator working group, with KEK and with KURR-Institute at Kyoto University. They have been subject of contributions to PAC 08 and in the many BENE, EMMA and RACCAM meetings (available via web links).

- participation in the finalization of the EUROFFAG proposal in EuCARD FP7 IA and of the EURONu DS. Funds will be dedicated to EMMA upgrade.

Within RACCAM, WP5b has participated in a new application to the Agence Nationale de la Recherche, France, for 2008's funds for further R&D in the domain of spiral scaling FFAG lattice (the RACCAM++ project). Results expected. A new team has been constituted in that aim : LPSC (Grenoble, Coordinator Lab.), AIMA-Developpement (Nice, Lacassagne Hospital), IBA (Louvain-la-Neuve, Belgium), ETOILE (Lyon, Carbon Synchrotron Installation for hadron-therapy), SIGMAPHI (Vannes, magnet Industrial).

RACCAM in 2008 has gone on fostering collaboration with Japan (KEK and KURRI), including forming and sending of 2 French students who started PhD cursus at KURRI, on acceleration of muons by harmonic number jump and on FFAG (i.e. large acceptance) beam lines as proposed for instance in muon RLA (see FFAG2008 Manchester). RACCAM also has built and measured a S-FFAG magnet prototype in 2008, of the type that intervenes in the S-FFAG type of muon accelerators (NuFactJ).

Finally, BENE WP5b has veen involved in
- running of the European Accelerator School JUAS
- participation in the PAC09 SPC
- invited participation in CERN-HHH workshop, Nov. 2008, CERN
- organization of two workshops in UK (Daresbury, January, and John Adams Institute, Oxford, November, regarding development and use of FFAG beam dynamics codes in the frame of the EMMA and PAMELA projects)

WP5c (BETABEAM) In its last year, the beta-beam BENE WP continued to be the link between the beta-beam activities (the betabeam WP within the FP6 design EURISOL DS, the preparation of the proposal of a WP in the FP7 EuroNu design study and more) and the neutrino physics community. The Eurisol design study is making good progress and the BENE community has been updated on a regular basis through the BENE meetings on this progress. As there is no work package on oscillation physics with electron (anti-)neutrino beams within the design study and that the BENE meetings are also the only forum for these two communities to meet.

The beta-beam team at CERN in 2008 participated in the general BENE meeting, in specially organized local meetings and, in the IDS, meetings to discuss how the beta-beam facility should evolve to increase the physics reach of the facility. A monograph on beta-beams – theory, phenomenology and machine aspects − has been produced in 2008 and will be published as a single volume in spring 2009. The discussions on a beta-beam facility at DESY continued and a presentation was made at DESY of the beta-beam concept in the autumn 2008. The beta-beam concept was also presented to ICFA at the general meeting at Stanford in the summer of 2008. The work on new production methods e.g. direct production at low energy but high intensity through the formation of compound nucleus has continued and was presented at NUFACT08. The web site for the beta-beam at http://cern.ch/beta-beam is documenting the progress within the design study and gives reference to new published work.

N2.5 Overall Progress of Work Packages

Work Package 1: PHYSICS.

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP1	**PHYSICS**				
1.1	Improvement of the WP Web Site	Jan. 2008	Mar 2008	100%	Completed
1.2	WP Spring Meeting	Mar 2008	Mar 2008	100 %	held jointly with IDS in Jan and June
1.3	Close in on physics analysis, motivate EuCARD/NEu2012 proposal	Jan 2008	Feb 2008	100%	
1.4	Topical Workshop at WP Summer Meeting	Jul 2008	Jul 2008	100 %	at NuFact08, July
1.5	WP Fall Meeting	Oct 2008	Oct 2008	100 %	at BENE08 in Dec
1.6	Physics sections of final BENE Report	May 2008	Dec 2008	100%	completed early 2009

Work Package 2: DRIVER

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP2	**DRIVER**				
2.1	Improvement of the WP Web Site	Jan 2008	Mar. 2008	100%	Completed
2.2	Finalize criteria of SPL vs RCS comparison	Jan 2006	Mar. 2006	40% Taking longer!!	> 2008, larger picture emerging, CERN Council oversees
2.3	Identify R&D beyond HIPPI, motivate EuCARD R&D proposal	Jan 2008	Feb 2008	100 %	
2.4	WP Spring Meeting	Mar 2008	Mar 2008	100 %	held jointly with IDS in Jan and Jun
2.5	Topical Workshop at WP Summer Meeting	Jul 2008	Jul 2008	100 %	at NuFact08, July
2.6	WP Fall Meeting	Oct 2008	Oct 2008	100 %	at BENE08 in Dec
2.7	Driver sections of final BENE Report	May 2008	Dec 2008	100%	completed early 2009

Work Package 3: TARGET

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP3	**TARGET**				
3.1	Improvement of the WP Web Site	Jan 2008	Mar. 2008	100%	Completed
3.2	Close in on hi power target choice, motivate EuCARD R&D proposal	Jan 2008	Feb 2008	100%	
3.3	WP Spring Meeting	Mar 2008	Mar 2008	100 %	held jointly with IDS in Jan and Jun
3.4	International Target Workshop	Sep 2008	Sep 2008	100 %	Oxford (May 2008) & Princeton (Nov 2008)
3.5	WP Fall Meeting	Oct 2008	Oct 2008	100 %	at BENE08 in Dec
3.6	Target sections of final BENE Report	May 2008	Dec 2008	100%	completed early 2009

Work Package 4: COLLECTOR

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP4	**COLLECTOR**				
4.1	Improvement of the WP Web Site	Jan 2008	Mar. 2008	100%	Completed
4.2	Close in on collector choice, motivate EuCARD R&D proposal	Jan 2008	Feb 2008	100%	
4.3	WP Spring Meeting	Mar 2008	Mar 2008	100 %	held jointly with IDS in Jan and Jun
4.4	International Topical workshop	Aug 2008	Aug 2008	100 %	joint with TARGET
4.5	WP Fall Meeting	Oct 2008	Oct 2008	100 %	at BENE08 in Dec
4.6	Collector sections of final BENE Report	May 2008	Dec 2008	100%	completed early 2009

Work Package 5: NOVEL NEUTRINO BEAMS

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP5	**NOVEL NEUTRINO BEAMS**				
5.1	Improvement of the WP Web Site for the three areas of interest of the WP	Jan 2008	Mar. 2008	100%	Completed
5.2	Assemble NuFact and Betabeam guidelines for EuCARD R&D proposal	Jan 2008	Feb 2008	100%	
5.3	WP Spring Meeting	Mar 2008	Mar 2008	100 %	held jointly with IDS in Jan and Jun
5.4	Topical Workshop at WP Summer Meeting	Aug 2008	Aug 2008	100 %	at NuFact08, July
5.5	WP Fall Meeting	Oct 2008	Oct 2008	100 %	at BENE08 in Dec
5.6	WP multiple sections of EuroNu Proposal	May 2008	Dec 2008	100%	completed early 2009

N2.6 Significant Achievements

- Submission and approval of FP7 neutrino related WPs within th EuCARD IA
- Begin of the International Design Study for a Neutrino Factory
- Major milestone : MERIT validating design of hi power Li-Hg targets

N2.7 List of all deliverables during the reporting period

Deliverable/ Milestone No	Deliverable/Milestone Name	Workpackage /Task No	Lead Contractor(s)	Planned (in months)	Achieved (in months)
D	**Proposal for design studies and R&D (EuCARD Work Packages)**	All WPs	INFN-Na	50	50
D	**Final report of the BENE network**	All WPs	INFNNa CERN	60	60
D	**Proceedings of NuFact'08 workshop**	All WPs	INFNNa CSIC	60	60

N2.8 List of major meetings organized under BENE during the reporting period

Date	Title/subject	Location	Number of participants	Web Site Address
Jan 16-17	1st -meeting of the IDS-NF	RAL	50	http://www.hep.ph.ic.ac.uk/ids/communication/RAL-2008-01-16/index.html
Feb 5	pre meeting of Eurov GB & SG	CERN	35	http://bene.web.cern.ch/bene/GB-01-agenda-GB_kick-off_Meeting.doc http://hepwww.rl.ac.uk/euro-neutrino/meeting-1-5Feb08/CB/EUROnu-CB-meeting-1-agenda.htm
May 1-2	High Power Target Workshop	Oxford	35	http://www.physics.ox.ac.uk/users/peachk/HPT/Talks.htm
10-13 Jun	2nd -meeting of the IDS-NF	Fermilab	50	https://www.ids-nf.org/wiki/FNAL-2008-06-10, http://www.hep.ph.ic.ac.uk/ids/communication/FNAL-2008-06-10/index.html
Jun 9-27	NuFact08 Summer school,	Benasque	30+ lecturers	http://ific.uv.es/nufact08/school/index.html
Jun 30-Jul 05	NuFact08 Workshop	Valencia	200	http://ific.uv.es/nufact08/
1-5 Sep	FFAG08	Manchester	50	http://www.cockcroft.ac.uk/events/FFAG08/programme.htm
Oct 11-13	NNN08	Kyoto	110	http://nnn08.in2p3.fr/
Nov 6-7	High Power Target Workshop	Princeton	40	http://www.physics.princeton.edu/mumu/target/
Dec 2-3	BENE08	CERN	40	http://bene.web.cern.ch/bene/BENE08agenda.htm

1.3.3 N3: High-Energy High-Intensity Hadron Beams (HHH)

HHH is the Care network for High Energy High Intensity Hadron Beams. It comprises 8 countries plus CERN. The list of participants and their implication in the HHH Work Packages (C: Coordination, X: participation) is given in the table below. The overall management is done by CERN.

Number	Participant	WP1 AMT	WP2 ABI	WP3 APD
1	**CEA**	X		
4	**GSI**	X	X	X
6	**DESY**		**C**	X
10	**INFN**	X		X
	INFN-Ge	X		
	INFN-LNF			X
	INFN-Mi	X		
	INFN-Na			X
	INFN-Sal			X
11	**TEU**	X		
15	**WUT**	X		
16	**CSIC**			X
	CIEMAT	X		
	LEII			X
17	**CERN**	**C**	**C**	**C**
19	**PSI**		X	
20	**STFC**	X		

In 2008 the networking activity of CARE-HHH concluded 5 years of studies for the high-luminosity upgrade of the LHC at CERN, the upgrade of the LHC injector complex, and the FAIR project at GSI. Significant progress was made on the optics design of a PS successor "PS2", on electron-cloud suppression methods, on the upgrade of the LHC interaction regions, and high-luminosity parameters. In terms of budget and resources, these greatly expanded activities reach far beyond HHH.
The number of identified LHC high-luminosity upgrade paths has increased to 4: The early separation (ES) and large-Piwinski angle (LPA) schemes, developed since 2005/6, were complemented by two new options, based on either full crab crossing (FCC) or low emittance (LE). Special LHCb-compatible upgrade scenarios were proposed. Discussions with LHC experiments clarified their preferences and set the machine upgrade plan in proper perspective. Validation requirements for LHC crab cavities were established. A tentative schedule includes the installation of a prototype global crab cavity by 2012/13, and a parallel effort on more compact local crab cavities for an ultimate local crabbing scheme.
The development of an alternative fast-cycling magnet design has converged, culminating in the procurement of a pulsed dipole with curved shape for FAIR from the INFN team.
H8-RD22 observed crystal deflection of negative pions and muons. The experiment UA9 for crystal collimation of protons and ions in the SPS ring proper was approved.

Electron-cloud mitigation techniques were further developed and qualified with beam. Certain carbon coatings suppressed the electron cloud build up with little aging. Coating on a rough black-metal surface is considered optimum. Enamel clearing electrodes also proved efficient.
An LHC long-range beam-beam compensator based on either high-Tc superconductor or cold copper was proposed. Other 2008 studies addressed the potential benefit from LHC "crab-waist" sextupoles including their use for long-range collisions and at collimators, electron lenses and high-energy coherent electron cooling. Online tune & chromaticity measurements were advanced; an overall orbit, tune & chromaticity control was prepared for the LHC; and the deformation of Schottky sidebands due to space charge was understood analytically, in measurements, and in simulations.

Networking aspects: Major HHH workshops in 2008 (LHC-CC08, WAMSDO, Channeling'08, HHH-2008, and CARE-HHH-ABI 2008 workshop) were organized to complement the above activities by reinforcing contacts with, and providing input and help from, the European partner institutes, especially GSI, DESY and INFN, as well as the international community, in particular US-LARP and KEK. Three dedicated CARE-HHH mini-workshops, on LHC crab-cavity validation (LHC-CCV), beam-beam effects and beam-beam compensation (BBC), and electron-cloud mitigation (ECM'08), advanced the R&D programme for these various upgrade ingredients. HHH participation in an ESA/ESTEC workshop, MULCOPIM'08, resulted in the first-ever collaboration between the accelerator and space-satellite community, on "electron-cloud" phenomena. For each of the above events, HHH supported some key participants.
LHC-CC08 and LHC-CCV helped form a worldwide crab-cavity collaboration. WAMSDO reviewed magnet targets and specifications for future accelerators and accelerator upgrades, low- and high-Tc s.c. materials and cables, in particular Nb3Sn, low-loss Nb-Ti and coated conductors, as well as the design of high-field and fast cycling s.c. magnets. The 2008 CARE-HHH-ABI workshop focused on transverse and longitudinal emittance measurement in hadron (pre-)accelerators, with sponsorship and support by HHH.
An HHH networking support for crystal channeling, reflection and collimation provided a forum of discussion to which many associated institutes in Russia and US, such as IHEP, PNPI, JINR and FNAL, have contributed. The international conference "Channeling'08" was co-organized by HHH. In 2008 HHH supported participation in beam experiments with crystals at the SPS and the FNAL Tevatron as well as related theoretical studies.
Joint studies on energy deposition from collision debris with INFN and US-LARP, and on incoherent electron cloud effects with GSI and SLAC remained key R&D items; HHH-2008 boosted the CERN-GSI collaboration on collective beam phenomena in high-intensity beams.

Deliverables: In the frame of WP1 (AMT) the contents of the web based database for SC Cables and Magnets was extended to include data from Tevatron, RHIC and ITER, using the automatic tools developed in 2007. Additional simulation programs were included in the accelerator physics code repository of WP3 (APD). The WP3 (APD) web reference for booster synchrotron optics (PS2) was completed.

Events: A total of 7 workshops and mini-workshops were organized in 2008, one in WP1 (AMT), one in WP2 (ABI), and five in WP3 (APD). One of these, on LHC crab cavities, was organized jointly with US-LARP and BNL. The number of participants in all events exceeded expectation. They included not only representatives from several European HHH partner laboratories, but also from Japan (KEK), US-LARP, some industrial companies, and several representatives from the European Space Agency (ESA) and its collaborating institutes.

Dissemination and outreach: The dissemination effort for HHH information was maintained at a high level. Numerous invited talks were delivered, mostly by the HHH coordinators, which illustrated the HHH activity for various CERN and INFN committees, to the LHC experiments, at universities, as well as at workshops and conferences organized by other institutions. Noteworthy are invited presentations of the HHH upgrade strategy for LHC at the annual JPS meeting in March and during the international conference "Physics at the LHC" in September/October 2008, the co-organization of the International Conference "Channeling'08" by HHH in October, a discussion of possible transparent running scenarios for the LHCb Upgrade working group in August, the involvement of LHC experiments' representatives in HHH workshops, and numerous prominent contributions to the EPAC'08 conference. 22 new publications were issued from January through December 2008. The HHH web site was continually updated.

Exchanges and educational aspects: One European (UK) and one American magnet expert (NHMFL) were supported to visit CERN within WP1 (AMT), and another two American plus more than ten European scientists for the annual workshop of WP2 (ABI). Six European physicists (from INFN(2), GSI, ESA/ESTEC, PSI, and TU Vienna), four American scientists (from BNL(2), FNAL, and SLAC), two Russian visitors (JINR Dubna), and one Japanese expert (KEK) were hosted and supported for HHH studies in the frame of WP3 (APD) for periods between 1 and 4 weeks, to contribute to studies on crystal collimation, electron-cloud effects including their mitigation, beam-beam interaction, crab cavities, and the generation of flat beams. Two EU summer students and six EU doctoral students were active at CERN on issues related to WP1 and 3 (AMT and APD), namely IR upgrade, web databases, beam-beam compensation, new injector synchrotrons, and crystal experiments. One PhD student was partially supported by HHH for work on the s.c. database.

N3.1 Overall CARE-HHH Network activities in 2008 in chronological sequence

- **19-20 November 2007 (AMT):** CARE-HHH-AMT workshop on *Heat Generation and Heat Transfer in Superconducting Magnets* (THERMOMAG'07), Paris, 2 days; about 70 participants; main topics: cooling techniques (fluids and regimes); heat transfer mechanisms; modeling of heat transfer from coils to cooling system; heat transfer experiments; and common set of thermal design criteria

- **28 & 29 November and 3 December 2007 (dissemination):** F. Zimmermann presented summaries of the CARE-HHH IR'07 and BEAM'07 workshops for AB-ABP-LCU, the LHC Interaction-Region upgrade WG, and the PAF-WG

- **11-12 December 2007 (ABI): 5th** CARE-HHH-ABI workshop on *Schottky, Tune and Chromaticity Diagnostics (with Real-Time Feedback),* Chamonix, France; about 30 participants; topics: online tune & chromaticity measurements, preparing overall LHC orbit, tune & chromaticity control, deformation of Schottky sidebands due to space charge

- **25-26 February 2008 (APD):** Joint CARE-HHH-APD, BNL & US-LARP mini-workshop on *LHC Crab Cavities* (LHC-CC08), BNL, U.S.A., about 30 participants, 3 of which supported by HHH; main topics: KEKB experience, R&D plan for crab cavities, phased approach, international collaboration

- **10-28 March 2008 (APD):** Visit to CERN by M. Pivi (US-LARP/SLAC) for simulating incoherent electron-cloud effects. Achievements: completion and benchmarking of novel simulation code "CMAD" for detailed modeling of electron-cloud effects in LHC & SPS;

setting up of serial and parallel CMAD electron-cloud computations for the actual MAD optics of LHC and SPS on the CERN linux cluster; discussions on countermeasures for the SPS upgrade, including pertinent R&D program undertaken at PEP-II and CESR-TA

- **19 and 20 March 2008 (dissemination):** M. Pivi (SLAC) discussed the *CMAD simulation status* in an expert discussion at CERN, and he reviewed the *electron-cloud R&D for future linear colliders* in a CERN AP Forum, respectively.

- **24 March 2008 (dissemination):** At the 63rd *annual meeting of the Physical Society of Japan (JPS)*, Osaka, F. Zimmermann presented the *status, schedule and future of LHC*

- **9 April 2008 (coordination):** At the *CARE Steering and Dissemination Board Meeting*, LPNHE, Paris, W. Scandale presented the HHH 1st Quarterly Status Report 2008

- **14 April 2008 (dissemination):** At a meeting of the PAF-WG, F. Zimmermenn reviewed the outcome of the LHC-CC08 workshop and the LHC crab effort for 9 PAF members

- **23-25 April 2008 (APD):** ICFA Beam Dynamics Mini-Workshop on Deflecting / Crabbing Cavity Applications in Accelerators; SINAP, Shanghai, China; 41 participants; main workshop topics: deflecting/crabbing cavity R&D for high energy colliders, synchrotron light sources. beam manipulations, emittance exchanges, and diagnostics; fellow Y. Sun represented HHH and discussed LHC crab-cavity issues

- **19-23 May 2008 (AMT):** CARE-HHH-AMT workshop on *Accelerator Magnet, Superconductor, Design and Optimization* (WAMSDO), CERN; 107 participants, two of which supported by HHH; main topics: magnet targets and specifications, low- and high-Tc s.c. materials and cables, in particular Nb3Sn, low-loss Nb-Ti and coated conductors, design of high-field and fast cycling s.c. magnets

- **23-27 June 2008 (dissemination):** *11th European Particle Accelerator Conference* (EPAC'08), Genoa, Italy; 8 presentations from CARE-HHH related to LHC IR upgrade and the CERN injector-complex upgrade; the overall LHC upgrade plan was presented by R. Garoby

- **June/July 2008 (APD):** short term visits to CERN of E. Vallazza (INFN Trieste) and M. Prest (U. Insubria) for participation in SPS H8-RD22 crystal experiments

- **1 and 8 July - 26 September 2008 (AMT and dissemination):** two summer students, L. Beemster & O. Schütt, assisted with data recovery for Fermilab & RHIC superconductors

- **15 July 2008 (APD):** *CERN-KEK crab collaboration* kick-off video & webex meeting with contributions from K. Oide (2x), Y. Morita and R. Calaga

- **4-29 August 2008 (APD):** Visit to CERN by K. Ohmi (KEK) in the frame of a HHH collaboration on LHC beam-beam effects and crab cavities. Achievements: strong-strong and weak-strong beam-beam simulations for various LHC upgrade scenarios; extracted LHC crab-cavity noise tolerances from simulations; discussed KEKB crab-cavity experience and pertinent simulations; and proposed various applications of crab-waist

sextupoles to the LHC upgrade (factor 3 luminosity gain for ultra-low beta*, possible use for mitigating long-range beam-beam effects, or collimation)

- **5 August 2008 (dissemination):** At an *LHCb upgrade meeting* F. Zimmermann presented an *Overview of LHC Machine Upgrade Plans from an LHCb Perspective,* in front of about 50 LHCb experimenters, and proposed transparent running scenarios for LHCb

- **5 August 2008 (APD):** Second video & webex meeting of *CERN-KEK crab collaboration* with talks by K. Oide, F. Zimmermann, R. Calaga, Y. Funakoshi, K. Ohmi

- **21 August 2008 (APD):** CARE-HHH-APD mini-workshop on *LHC Crab-Cavity Validation* (LHC-CCV), CERN; 28 participants, including 16 from CERN, 5 from US-LARP, 4 from KEK, 2 from the UK, and 2 from other European countries; main topics: prospects of crab cavities in LHC upgrades; status of the cryomodule development and beam dynamics; validity requirements for LHC crab cavities; guidance & coordination for global collaborators.

- **25-29 August 2008 (APD):** Visit to CERN by U. Dorda (TU Vienna) on LHC beam-beam effects and SPS beam-beam compensation experiments. Topics of exploration: tune sensitivity of compensation; power law for lifetime vs. distance and its dependence on the tunes; "threshold" for collisions at reduced distance; simulations of long-range beam-beam experiments; "RF compensator"

- **28 August 2008 (APD):** CARE-HHH-APD mini-workshop on *LHC Beam-Beam Effects and Beam-Beam Compensation* (BBC), CERN; about 17 participants, including 3 from US-LARP/BNL and 1 from KEK. Main topics: wire compensation, simulations and concepts for LHC upgrade scenarios, experiments on the beam-beam effect

- **15 September 2008 (dissemination):** W. Scandale discussed the LHC machine upgrade plans for an audience of about 80 detector experts at the "LHC Upgrade Days" organized by the INFN Group 1 in Pisa

- **17 September 2008 (coordination):** at the *CARE Steering and Dissemination Board Meeting*, CERN, F. Zimmermann presented the HHH 2nd Quarterly Status Report 2008

- **22 September 2008 (APD):** At a PAF meeting with 5 participants F. Zimmermann discussed prospects for the LHC LE upgrade scheme originally suggested by R. Garoby

- **24-26 September 2008 (APD):** international workshop in *Multipactor, Corona and Passive Intermodulation* (MULCOPIM'08) for space high-power RF hardware, Valencia, Spain, organized by ESA/ESTEC; about 140 participants in total, including 5 accelerator physicists, three of whom supported by HHH. F. Caspers, R. Cimino, F. Le Pimpec G. Rumolo, and F. Zimmermann reviewed electron-cloud effects in particle accelerators. Topics of HHH interest: porous coatings developed as key part of ESA's mitigation strategy, ESA SEY database; ESA standard for multipactoring design and test; simulation software FEST3D, MEST and CEST; novel suppression scheme based on a locally inhomogeneous magnetic field

- **24 September – 1 October 2008 (dissemination):** international conference *Physics at LHC-2008*, Split; about 200 participants; W. Scandale presented LHC upgrade scenarios

- **7 and 14 October 2008 (dissemination):** F. Zimmermann summarized the MULCOPIM'08 workshop for CERN AB-ABP-LCU and for the SPS Upgrade WG

- **9 October – 7 November 2008 (APD):** Visit to CERN by A. Tarantin (JINR Dubna) for simulating crystal collimation and follow-up of SPS H8-RD22 experiment

- **25 October -1 November 2008 (dissemination):** international workshop on *Charged and Neutral Particles Channeling Phenomena* (Channeling2008) Erice, Italy, organized by INFN-LNF, co-organized by CARE-HHH; 124 participants. W. Scandale reported results of SPS crystal experiments; main workshop topics: coherent scattering of relativistic charged particles in matter, radiation in periodic structures, crystal channeling, volume capture and crystal reflection of positive ions, crystal assisted collimation in hadron colliders, channeling of radiation, novel types of sources for electromagnetic radiation

- **30 October - 27 November (APD):** Visit to CERN by C. Bhat (US-LARP/FNAL) for studies on the LHC upgrade scheme LPA. Achievements: conception and simulation of possible scenarios for the generation and stability of long flat bunches in the PS and in the LHC; proposal of, and participation in, pertinent beam studies at the PS and SPS

- **1-30 November 2008 (APD):** HHH extends the CERN visit by R. Calaga, (US-LARP/BNL) for advancing the LHC crab cavity design, steering global collaboration, and coordinating strategy with CERN management and US-LARP

- **12 November 2008 (AMT and coordination):** W. Scandale participated in a DISCORAP review for the design of fast pulsed s.c. magnets of curved shape at INFN Genoa

- **20-21 November 2008 (APD):** CARE-HHH-APD Mini-Workshop on *Electron-Cloud Mitigation* (ECM'08), CERN; 50 participants, 20 of whom from CERN 3 from INFN-LNF, 7 from ESA and its collaborators in the Netrherlands and Spain, 5 from USA, 3 from FZ Karlsruhe, 1 from KEK, 2 from the UK, and 1 accelerator physicists from Spain. Main topics: overview of electron-cloud related activities and projects; mitigation methods – coatings, electrodes, and feedback; beam measurements; simulations; areas of collaboration and outstanding questions

- **24-25 November 2008 (APD, AMT, ABI):** CARE-HHH workshop on *Scenarios for the LHC Upgrade and* FAIR (HHH-2008), Chavannes-de-Bogis, Switzerland; 43 participants. Main topics: LHC IR upgrade; LHC beam parameters upgrade; CERN injector complex upgrade and FAIR; HHH beam instrumentation highlights; high-field and fast-ramping s.c. magnet development; FFAGs; electron-cloud effects and mitigation; crab cavities; collimation upgrade and crystals; perspectives.

- **2-5 December 2008 (dissemination and coordination):** *CARE Annual Meeting* (CARE'08); 113 participants. The following HHH presentations were given:
  - Pulsed Magnets with Curved Shape for FAIR, P. Fabbricatore
  - Crystal Collimation Update, W. Scandale ; - LHC Crab Cavities, R. Calaga
  - Summary Report on HHH Activities, W. Scandale and F. Zimmermann

- **3 December 2008 (coordination):** CARE Governing Board Meeting, CERN, about 10 participants; W. Scandale presented the HHH status and summary

- **8-19 December 2008 (APD):** During a visit to KEK, R. Tomas participates in KEKB crab-cavity beam studies and follow-up discussions, as part of the CERN-KEK crab collaboration launched by HHH

- **9 December 2008 (dissemination):** Presentation of LHC upgrade scenarios for phases 1 & 2 at "New Accelerator Day" in Roma III by W. Scandale; about 50 participants, including 35 students

- **9 December 2008 (APD and dissemination):** F. Zimmermann attended meeting on proton-driven plasma wakefield acceleration at MPI Munich; about 12 participants. Topics: basic scheme; beam requirements; suitability of the present and upgraded CERN accelerator complex for proof-of-principle experiment; generation of short proton bunches

- **10-12 December 2008 (ABI): 6th** CARE-HHH-ABI workshop on *Transverse and Longitudinal Emittance Measurement in Hadron (Pre-)Accelerators*, Bad Kreuznach, Germany; 27 invited participants; highlight topics: results; facilities; transverse emittance measurement hardware & algorithm; longitudinal bunch shape & emittance measurement

Table 1: List of meetings, workshops and events (co-)organized by the HHH Network or with HHH contributions during 2008

Date	Title/subject	location	Main organizer	Number of participants	Comments and Web site
25-26 Feb	Mini-workshop on LHC Crab Cavities (LHC-CC08)	BNL (USA)	HHH-APD coordinators, US-LARP crab-cavity task leader, BNL	About 30	KEKB experience, R&D plan for crab cavities, phased approach, international collaboration; http://indico.cern.ch/conferenceDisplay.py?confId=24200
10-28 Mar	Visit to CERN of M. Pivi (US-LARP/SLAC)	CERN (CH)	HHH-APD coordinators	1	completion and benchmarking of novel simulation code "CMAD" for detailed modeling of electron-cloud effects in LHC & SPS; electron-cloud countermeasures including R&D program at PEP-II and CESR-TA; presentations: Electron Cloud R&D for Future Linear Colliders, CERN, AP Forum 20 March; CMAD Simulation Code Status, CERN, 19 March
24 Mar	63rd annual meeting Physical Society of Japan (JPS)	Kinki U., Osaka, Japan (J)	JPS meeting organizers	About 1000	special symposium on LHC and LHC detector and machine upgrade; HHH presentation on status, schedule and future of LHC; http://ab-dep-abp-frankz-lectures.web.cern.ch/ab-dep-abp-frankz-lectures/JPS Meeting March 2008/24pZE02.ppt
9 Apr	CARE Steering and Dissemination Board	LPNHE (F)	CARE coordinators	About 10	Meeting agenda http://esgard.lal.in2p3.fr/Project/Activities/Current/CAREmeetings/Management/Steering/april-09-2008/agenda-CARE-CSC-09-04-2008-v1.doc HHH presentation: http://care-hhh.web.cern.ch/CARE-HHH/Literature/08-04-09%20CARE-HHH-WS-FZ.ppt
14 Apr	PAF meeting	CERN (CH)	PAF chairman	9	outcome of LHC-CC08 workshop; http://care-hhh.web.cern.ch/CARE-HHH/Literature/LHC-CC08Summary-PAF-Meeting-14April2008-Zimmermann.ppt
23-25 Apr	ICFA Workshop on Deflecting / Crabbing Cavity Applications	SINAP (CN)	ICFA workshop organizers	41	deflecting/crabbing cavity R&D for high energy colliders, synchrotron light sources. beam manipulations, emittance exchanges, and diagnostics; fellow Y. Sun represented HHH and discussed LHC crab-cavity issues ; workshop web site http://www.sinap.ac.cn/ICFA2008/index.htm
19-23 May	WAMSDO workshop	CERN (CH)	HHH-AMT coordinators	107	accelerator magnet, superconductor. design and optimization ; http://indico.cern.ch/conferenceDisplay.py?confId=28832
23-27 Jun	EPAC'08	Genoa (I)	EPAC organizers	About 1200	1 talk and eight HHH papers; conference web site http://www.epac08.org

1/8 Jul – 26 Sep	summer students at CERN	CERN (CH)	HHH and HHH-AMT coordinators	2	L. Beemster and O. Schütt, assisted with the data recovery for Fermilab and RHIC superconductors
7-11 Jul	Visits to CERN of E. Vallazza (INFN Trieste) and M. Prest (U. Insubria)	CERN (CH)	HHH-APS coordinators	2	participation in SPS H8-RD22 crystal experiments
15 Jul	CERN-KEK crab collaboration kick-off	CERN (CH) & KEK (J)	HHH-APD & KEK coordinators	About 40	video & webex meeting, 4 presentations
4-29 Aug	Visit to CERN of K. Ohmi (KEK)	CERN (CH)	HHH-APD coordinators	1	LHC beam-beam effects and crab cavities; strong-strong and weak-strong beam-beam simulations for various LHC upgrade scenarios; LHC crab-cavity noise tolerances; KEKB crab-cavity experience; various applications of crab-waist sextupoles to the LHC upgrade
5 Aug	LHCb upgrade meeting	CERN (CH)	LHCb upgrade coordinators	About 50	Overview of LHC Machine Upgrade Plans from an LHCb Perspective ; http://care-hhh.web.cern.ch/CARE-HHH/Literature/overview of machine upgrade plan from an LHCB perspective-Zimmermann.pptx Meeting web site: http://indico.cern.ch/conferenceDisplay.py?confId=37786
5 Aug	2nd CERN-KEK crab collaboration meeting	CERN (CH) & KEK (J)	HHH-APD & KEK coordinators	About 40	video & webex meeting, 4 presentations
21 Aug	Mini-workshop on LHC Crab-Cavity Validation (LHC-CCV)	CERN (CH)	HHH-APD coordinators	28	prospects of crab cavities in LHC upgrades; status of the cryomodule development and beam dynamics; validity requirements for LHC crab cavities; guidance & coordination for global collaborators; workshop web site: http://indico.cern.ch/conferenceDisplay.py?confId=38210
25-29 Aug	Visit to CERN of U. Dorda (TU Vienna)	CERN (CH)	HHH-APD coordinators	1	studies of LHC beam-beam effects & beam-beam compensation, and participation in SPS beam-beam compensation experiments
28 Aug	Mini-workshop on LHC Beam-Beam Effects and Beam-	CERN (CH)	HHH-APD coordinators	17	wire compensation, simulations and concepts for LHC upgrade scenarios, experiments on the beam-beam effect; workshop web site: http://indico.cern.ch/conferenceDisplay.py?confId=38353

	Beam Compensation (BBC)				
15 Sep	LHC Upgrade Days	INFN Pisa (I)	INFN Group-1 coordinators	About 80	Research & development for LHC detectors in Italy ; http://care-hhh.web.cern.ch/CARE-HHH/Literature/Scandale_08-10-03_sLHC.pptx
17 Sep	CARE Steering and Dissemination Board	CERN (CH)	CARE coordinators	About 10	Meeting agenda http://esgard.lal.in2p3.fr/Project/Activities/Current/CAREmeetings/Management/Steering/september-17-18-08/agenda-CARE-CSC-17and18-09-08-v1.doc HHH presentation: http://care-hhh.web.cern.ch/CARE-HHH/Literature/CARE-HHH-2008-SteeringMeeting-September.pptx
22 Sep	PAF meeting	CERN (CH)	PAF chairman	5	LHC LE upgrade scheme ; http://care-hhh.web.cern.ch/CARE HHH/Literature/increasing the LHC luminosity by reducing the transverse.pptx
24-26 Sep	MULCOPIM'08	Valencia (E)	ESA/ESTEC MULCOPIM'08 organizers	About 140	porous coatings developed as key part of ESA's mitigation strategy, ESA SEY database; ESA standard for multipactoring design and test; simulation software FEST3D, MEST and CEST; novel suppression scheme based on a locally inhomogeneous magnetic field ; workshop web site http://www.cfp.upv.es/mulcopim08/inicio/index.html
24 Sep – 1 Oct	Physics at LHC - 2008	Split (RH)	Phsyicslhc organizers	About 200	LHC upgrade scenarios; workshop web site: http://www.fesb.hr/physicslhc/
7 Oct	CERN-AB-LCU meeting	CERN (CH)	LCU leader	About 20	Summary of MULCOPIM'08 ; http://care-hhh.web.cern.ch/CARE-HHH/Literature/MULCOPIMreportLCUZimmermann.pptx
14 Oct	SPSU meeting	CERN (CH)	SPSU coordinator	About 10	Summary of MULCPOIM'08 ; http://care-hhh.web.cern.ch/CARE-HHH/Literature/MULCOPIMreportSPSUZimmermann.pptx
9 Oct – 7 Nov	Visit to CERN by A. Tarantin (JINR Dubna)	CERN (CH)	HHH-APD coordinators	1	simulating crystal collimation and follow-up of SPS H8-RD22 experiment ; CARE Note http://care-hhh.web.cern.ch/CARE-HHH/Literature/note-2008-007-HHH.pdf
25 Oct – 1 Nov	Channeling 2008	Erice (I)	Workshop organizers and HHH-APD coordinators	124	coherent scattering of relativistic charged particles in matter, radiation in periodic structures, crystal channeling, volume capture and crystal reflection of positive ions, crystal assisted collimation in hadron colliders, channeling of radiations in capillary systems, novel types of sources for electromagnetic radiation; SPS crystal experiments; workshop web site: http://www.lnf.infn.it/conference/channeling2008/main_home.html

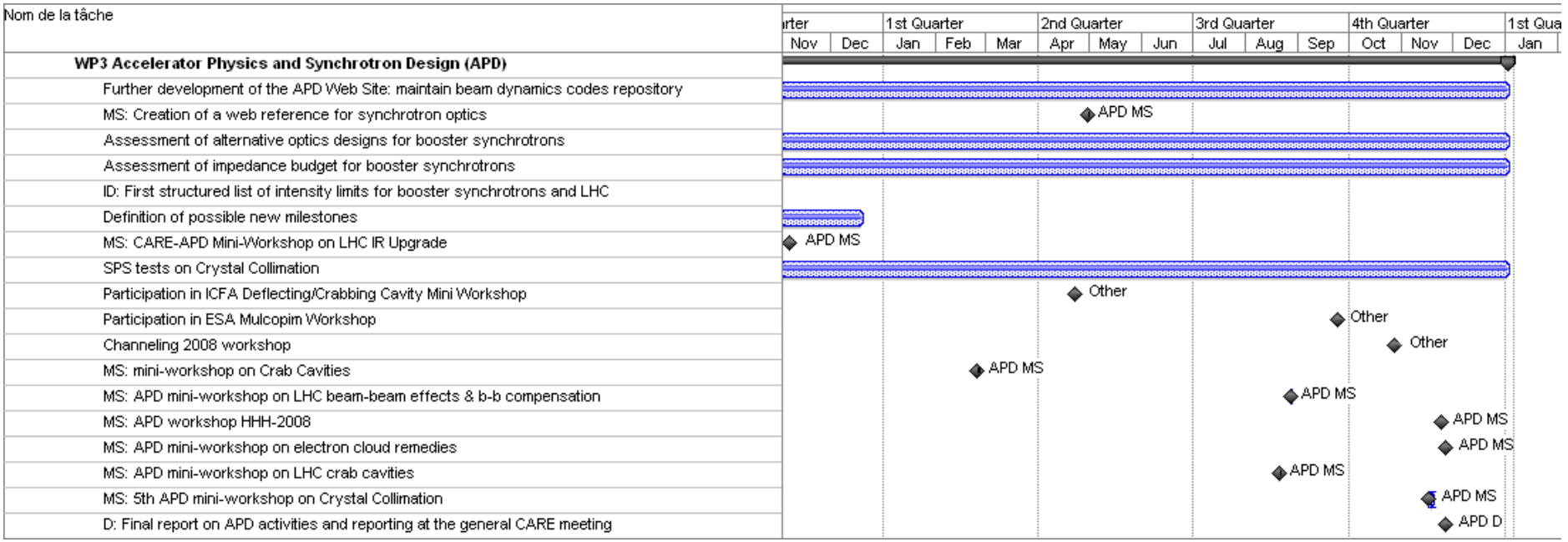
30 Oct – 27 Nov	Visit to CERN by C. Bhat (US-LAPR/FNAL)	CERN (CH)	HHH-APD and US-LARP coordinators	1	studies on the LHC upgrade scheme LPA. Achievements: conception and simulation of possible scenarios for the generation and stability of long flat bunches in the PS and in the LHC; proposal of, and participation in, pertinent beam studies at the PS and SPS
1 – 30 Nov	Extended visit to CERN by R. Calaga (US-LARP/BNL)	CERN (CH)	HHH-APD, US-LARP and BNL coordinators	1	LHC crab cavity design; management of global collaboration; coordination with CERN management and US-LARP
12 Nov	DISCORAP review	INFN Genoa (I)	INFN and HHH-APD coordinators	About 15	review of the design for fast pulsed s.c. magnets of curved shape
20-21 Nov	ECM'08	CERN (CH)	HHH-APD coordinators	50	overview of electron-cloud related activities and projects; mitigation methods – coatings, electrodes, and feedback; beam measurements; simulations; areas of collaboration with ESA, and outstanding questions ; workshop web site: http://indico.cern.ch/conferenceDisplay.py?confId=42645
24-25 Nov	HHH-2008	Chavannes-de-Bogis (CH)	HHH coordinators	43	LHC IR upgrade; LHC beam parameters upgrade; CERN injector complex upgrade and FAIR; HHH beam instrumentation highlights; high-field and fast-ramping s.c. magnet development; FFAGs; electron-cloud effects and mitigation; crab cavities; collimation upgrade and crystals; perspectives; workshop web site: http://indico.cern.ch/conferenceDisplay.py?confId=43275
2-5 Dec	CARE'08	CERN (CH)	CARE coordinators	113	Annual CARE Meeting CARE'08: http://care08.web.cern.ch/care08/
3 Dec	CARE Governing Board	CERN (CH)	CARE coordinators	About 10	HHH status and summary
9 Dec	New Accelerator Day	Roma-III (I)	Roma-III Coordinators	About 50 (35 students)	invited presentation on LHC upgrade scenarios for phase 1 and phase 2
9 Dec	Meeting on proton-driven plasma wakefield acceleration	MPI Munich (D)	MPI director	About 12	discussion on plasma proton-beam experiments with the present and upgraded CERN accelerator complex; requirements; generation of short proton bunches; meeting web site: http://www.mppmu.mpg.de/~caldwell/PDPWA/PDPWA-9_12_2008.html
10-12 Dec	HHH-ABI annual workshop	Bad Kreuznach (D)	HHH-ABI coordinators	About 27	6th CARE-HHH-ABI workshop on *Transverse and Longitudinal Emittance Measurement in Hadron (Pre-)Accelerators*; usage of results, description of facilities; transverse emittance measurement hardware & algorithm; longitudinal bunch shape and emittance measurement; http://adweb.desy.de/mdi/CARE/Bad_Kreuznach/ABI_workshop_2008.html

8-19 Dec	Visit to KEK by R. Tomas (CERN)	KEK (J)	CLIC project leader and HHH-APD coordinators	1	participation in KEKB crab-cavity beam studies and follow-up discussions, as part of the CERN-KEK crab collaboration

Table 3: Temporary staff hiring

#	Lab	Job Type	Duration	Work subject	Status
1	CERN	PhD student	3 y (part time)	Database for superconducting cables and magnets	CERN doctoral student
2	CERN	Fellow	2 years	LHC crab cavities and IR upgrade	CERN fellow
3	CERN	Summer student	2 months	Database for superconducting cables and magnets	CERN summer student
4	CERN	Summer student	2 months	Database for superconducting cables and magnets	CERN summer student

Gantt table of the HHH Network progress through 2008


Nom de la tâche
rter
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
1st Qua
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
WP3 Accelerator Physics and Synchrotron Design (APD)
Further development of the APD Web Site: maintain beam dynamics codes repository
MS: Creation of a web reference for synchrotron optics
Assessment of alternative optics designs for booster synchrotrons
Assessment of impedance budget for booster synchrotrons
ID: First structured list of intensity limits for booster synchrotrons and LHC
Definition of possible new milestones
MS: CARE-APD Mini-Workshop on LHC IR Upgrade
SPS tests on Crystal Collimation
Participation in ICFA Deflecting/Crabbing Cavity Mini Workshop
Participation in ESA Mulcopim Workshop
Channeling 2008 workshop
MS: mini-workshop on Crab Cavities
MS: APD mini-workshop on LHC beam-beam effects & b-b compensation
MS: APD workshop HHH-2008
MS: APD mini-workshop on electron cloud remedies
MS: APD mini-workshop on LHC crab cavities
MS: 5th APD mini-workshop on Crystal Collimation
D: Final report on APD activities and reporting at the general CARE meeting
APD MS
APD MS
Other
Other
Other
APD MS
APD MS
APD MS
APD MS
APD MS
APD MS
APD D

N3.2 Overall progress of Work Packages

Status with respect to the interim reports and deliverables to be done in 2008 according to the MS project breakdown in sub-tasks, Mile-Stones (MS), Intermediate Deliverables (ID), and main Deliverables (D).

WBS #	Title	Due date	Status	Delivery date
General	MS: annual HHH meeting	T4-2008	100 %	T4-2008
	ID: Annual Report 2008	T4-2008	100%	T4-2008
WP1-AMT	Codes and models for design, stability and protection studies for AMT1 and AMT4	T4-2007	100%	T4-2008
	Comparison of different IR options (AMT4) and steering of LARP magnet developments	T2-2007	100%	T4-2008
	MS: AMT workshop on coil insulation and impregnation techniques (THERMOMAG)	T4-2008	100 %	T4-2007
	Studies of pulsed SC magnets for GSI and LHC injectors	T4-2008	100 %	T4-2008
	Determination of scaling law for magnet and cryogenic cost for AMT5	T1-2008	78 %	T4-2008
	MS: Preliminary report on scaling law for magnet and cryogenic cost (roadmap)	T1-2008	50 %	T4-2008
	D: Development of web based database for sc cable and magnets	T4-2008	100%	T3-2007
	D: Final report on AMT activities and reporting at the general CARE meeting	T4-2008	100%	T4-2008
	MS: AMT workshop on Accelerator Magnet, Superconductor, Design and Optimization	T4-2008	100%	T2-2008
WP2-ABI	Definition of possible new milestones	-	100%	T4-2008
	Contribution to beam measurements and preparation for LHC commissioning	-	100%	T4-2008
	ID: proceedings of the 5th ABI topical workshop	T2-2008	100 %	T2-2008
	D: Final report on ABI activities and reporting at the general CARE meeting	T4-2008	100%	T4-2008
	MS: 6th ABI workshop on transverse and longitudinal emittance measurement in hadron (pre-)accelerators	T4-2008	100%	T4-2008
	ID: proceedings of the 6th ABI topical workshop	-	0 %	T1-2009

WP3-APD	Further development of the APD Web Site: maintain beam dynamics codes repository	-	100%	T4-2008
	MS: Creation of a web reference for synchrotron optics	T4-2007	100 %	T1-2008
	Assessment of impedance budget for booster synchrotrons	T4-2007	100%	T4-2008
	Assessment of alternative optics designs for booster synchrotrons	T2-2008	100%	T4-2008
	SPS tests on crystal collimation	-	100%	T4-2008
	Participation in ICFA Deflecting/Crabbing Cavity Mini Workshop	-	100%	T2-2008
	Participation in ESA Mulcopim Workshop	-	100%	T3-2008
	Channeling 2008 workshop	-	100%	T3-2008
	MS: joint HHH/US-LARP/BNL mini-Workshop on LHC Crab Cavities	T2-2008	100%	T2-2008
	MS: HHH-APD mini-Workshop on LHC Crab Cavity Validation	T4-2008	100%	T3-2008
	MS: HHH-APD Mini-Workshop on Electron-Cloud Mitigation 2008	T4-2008	100%	T4-2008
	MS: 5th HHH-APD Mini-Workshop on Crystal Collimation	T4-2008	0%	T4-2008
	MS: HHH-APD and HHH final Workshop HHH-2008	T4-2008	100%	T4-2008
	D: Final report on APD activities and reporting at the general CARE meeting	T4-2008	100%	T4-2008

NOTE: The originally planned *AMT workshop on HF magnets* was merged into the *AMT workshop WAMDSO* which covered additional subjects, due to modified R&D directions and altered priorities. *Scaling laws for s.c. magnets with regard to magnet performance* were developed in AMT and published in several articles, including peer-reviewed journals. Lack of resources and other priorities did not allow the completion of *scaling laws for cost* within the duration of CARE. The 5th *APD mini-workshop on crystal collimation* which had been foreseen for 2008 is postponed to beyond the end of the HHH programme (*24-27 March 2009*) due to a conflict with the preparatory work for the installation of the UA9 crystal experiment in the SPS during the second half of 2008. Several HHH mini-workshops and working meetings were organized in addition to those initially planned, for example on LHC crab-cavity validation, LHC beam-beam effects and beam-beam compensation, and electron-cloud mitigation.

N3.3 Significant Achievements

• Procurement of a pulsed dipole with curved shape for FAIR from INFN following development of fast-cycling s.c. magnet designs.
• Fourth scenario for the LHC luminosity upgrade based on lower emittance from upgraded injectors.
• Further development and partial testing with beam of novel electron-cloud mitigation methods (carbon coatings, black metals, mechanically or magnetically rough surfaces, low-impedance clearing electrodes, and wide-bandwidth feedback); launch of electron-cloud collaboration with the European Space Agency and its partners.
• Approval of experiment UA9 for crystal collimation of protons and ions in the SPS ring proper.
• Studies of advanced technological concepts for LHC, including crab cavities, long-range beam-beam compensation with high-temperature superconductor, crab-waist sextupoles, electron lenses and coherent electron cooling.

1.4 JOINT RESEARCH ACTIVITIES

1.4.1 JRA1: Superconducting Radio Frequency (SRF)

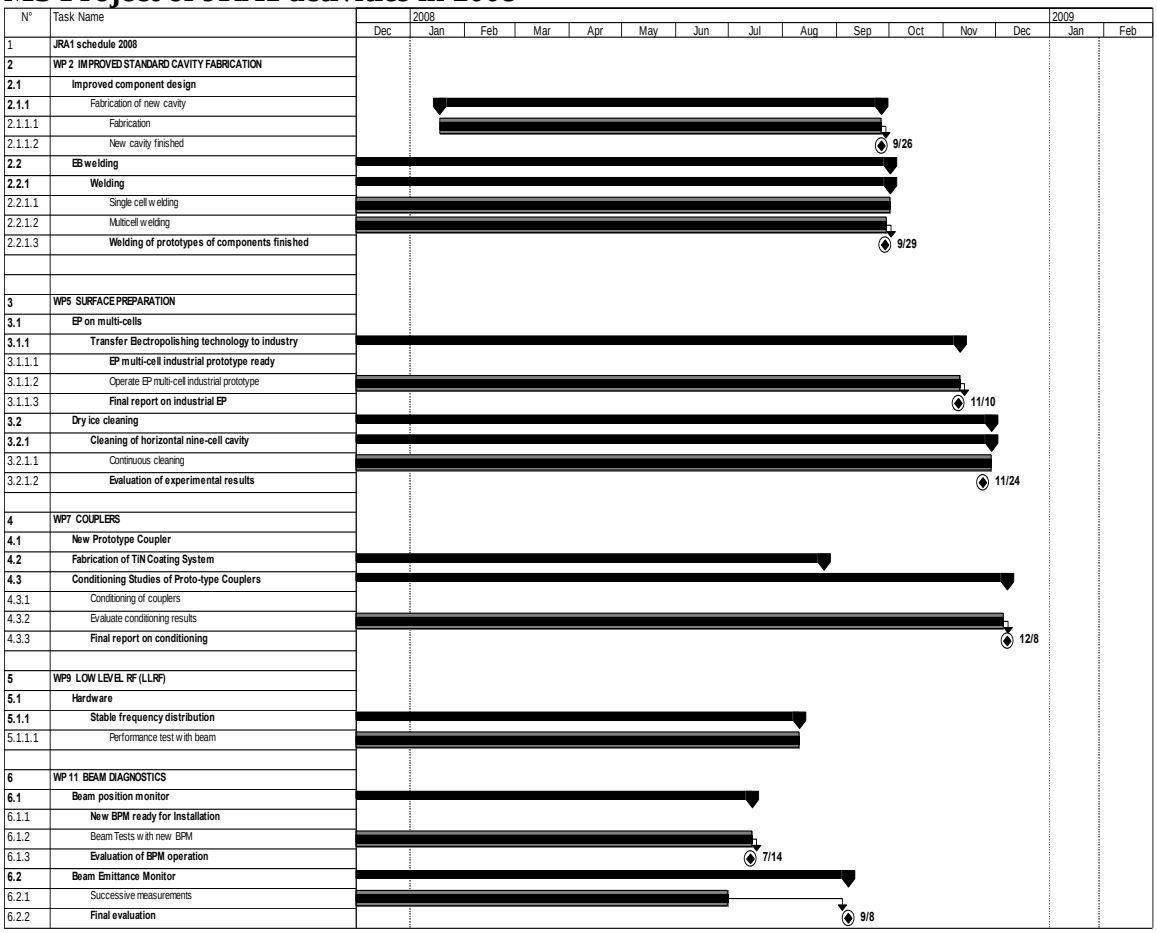
The list of participants and their implication in the SRF Work Packages (C: Coordination, X: Participation) is given in the table below. The overall management is done by DESY and CNRS-Orsay.

Number	Participant	WP1 M&C	WP2 ISCF	WP3 SCP	WP4 TFCP	WP5 SP	WP6 MA	WP7 COUP	WP8 TUN	WP9 LLRF	WP10 CIT	WP11 BD	Person-months
1	**CEA**					X			X		**C**	X	0,79
3	**CNRS**	**C**						**C**	X		X		**55,9**
	CNRS-IPNO								X				
	CNRS-LAL	**C**						**C**	X		X		
6	**DESY**	**C**	X	**C**		**C**	X			**C**			90(30)
10	**INFN**		**C**	X	X	X	**C**		X			**C**	**91(49)**
	INFN-LNF											**C**	31(12)
	INFN-LNL		X	X		X	**C**						47(35)
	INFN-Mi		**C**						X				12(2)
	INFN-Ro2				X								1
12	**TUL**								**C**	X			0
13	**IPJ**		X		**C**								0
14	**WUT-ISE**									X			0
19	**PSI**									X			8,7

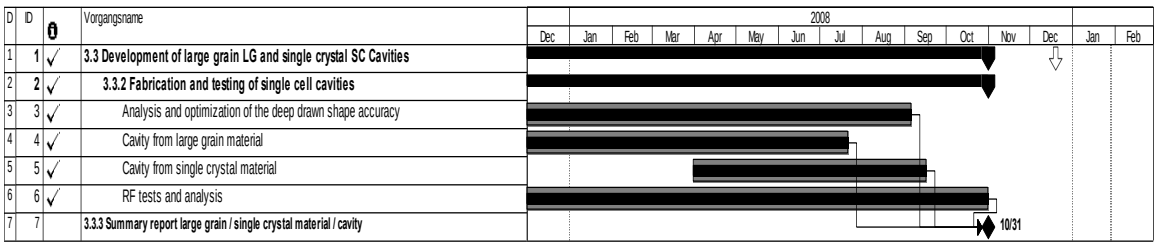
JRA1.1 Work Package 1: Management and Communication

The original schedule of JRA1 covered 4 years (2004 – 2007). Some work packages needed more time so that JRA1 was extended to 5 years (2007). In addition a new task was implemented in 2006 which is related to large grain and single crystal technology. It is based on the experience of material properties gained in the task "seamless by hydroforming". No additional EC support was requested for this task, the effort was covered by internal resources from DESY. The work of this task as well as the residual investigations in several remaining tasks in JRA1 are described in this annual report. An overview of these activities is presented in the MS Project charts. All promised deliverables as well as summary reports have been delivered.

MS Project of JRA1 activities in 2008



MS Project of additional activities in JRA1 (large grain, single crystal) in 2008



The aim of the JRA on Superconducting RF Technology is to improve the quality and performance of the superconducting test accelerator TTF (Tesla Test Facility), a unique test facility to explore the operating conditions of a high gradient superconducting accelerator, at DESY.

The ultimate objectives of this research activity are

- to increase the accelerating gradient from 25 to 35 MV/m and
- to increase the quality factor from 5×10^9 to 2×10^{10},
- to improve the reliability, operating performance and availability of the superconducting accelerating system,
- to achieve a cost reduction of the SRF cavities and their associated components.

JRA1.1.2 Meetings

List of major meetings organized under JRA1

Date	Title/Subject	Location	Number of attendees	Website address
26.-28.5.2008	CARE WP 3 and WP 6 meeting	INFN Legnaro	15	non
15.May 2008	JRA-WP7 Meeting	Orsay	5	non
17.-18.Sept.2008	CARE Steering Meeting	CERN	12	http://esgard.lal.in2p3.fr/Meeting/
6. Nov. 2008	JRA-SRF telephone meeting		9	non
Dec.2.-3. 2008	Annual JRA-SRF Meeting	CERN	18	http://care08.web.cern.ch/care08/

JRA1.2 Work Package 2: Improved Standard Cavity Fabrication

JRA1.2.1 Improved component design

Our activities during 2008 have been focalized on the development of new proposals that should lead to simpler and cheaper cavities. We started developing a theoretical model of the existing geometry. This model was verified by cold tests performed in horizontal cryostat and allowed us to identify the most critical parts. After that we developed new solutions, trying to keep the compatibility with the existing tools and devices (lateral tuner, tuning tool, supporting devices, etc.), to reduce the costs and also to allow the use of a coaxial tuner solution (for the ILC project).

Actual solution and welding procedure

The present cavity (TTF like) when dressed, is mainly composed by two end groups inclusive of the half cells, the internal dumb bells and the He-tank with the lateral tuner. The welding sequence and the preparation of reference surfaces is shown in Figure JRA1.2.1: . The procedure is the same for both the end groups: in the first step the NbRRR thin ring is welded, from the internal and external side, to the last half cell. Then the NbRG connecting ring is welded to the cell. In such a way two functions are accomplished: to stiffer the last half cell against the Lorentz Force detuning and to provide a good support for the end dishes. In the third phase the end dish is

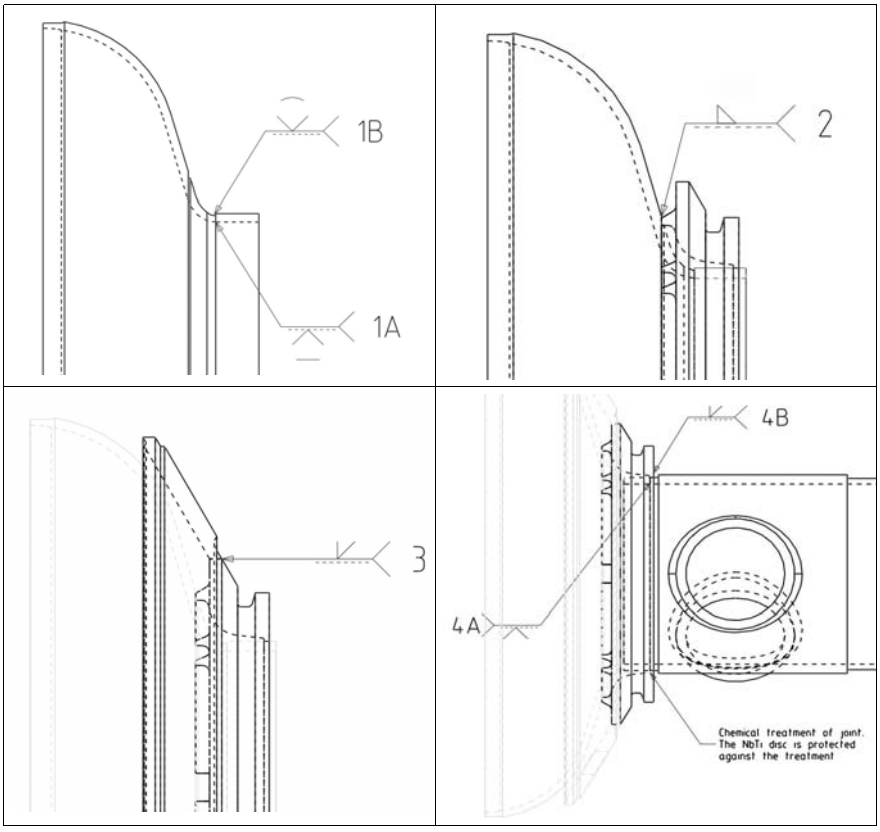


Figure JRA1.2.1: end group coupler side welding sequence. For sake of simplicity in the last weld sequence the HOM, pickup and flanges are not indicated.

welded to the NbRG ring from the external side (the only one accessible). The last step is the weld n. 4 (from internal and external side) between the thin ring, the connecting ring and the cavity end pipe already prepared with flanges, HOM and pick-up. After the execution of welds 4A and 4B, the reference surfaces on the ring are worked with high precision machines.

The first prototype

The minimization of the inter-cavity distance is one of the critical point to reduce the accelerator footprint. As a consequence, the present ILC reference layout [1] assumes a coaxial tuner solution since the reduced total cell-to-cell space is incompatible with the current TTF tuner overall dimension. Moreover, the actual He-tank is not compatible with a different tuner design. We started to develop a modified solution of the cavity, characterized by a new end dishes and He-tank designs. The goal of these modifications were to have an innovative design, compatible with coaxial tuner, and also with the lateral tuner adopted so far, if required. The modifications introduced in the design were tested by means of several horizontal tests on a traditional cavity equipped with the modified He-tank and with the coaxial blade tuner. Although the geometry was not optimized due to the existing constraints, the results proved the effectiveness of the adopted solution.
The modified He-tank is shown in Figure JRA1.2.. The differences with respect to the present solution are:

- the bellow allowing the tuner displacements is moved in the middle of the He-tank;
- the connection of the tank to the cavity end dishes does not require the bellow, that is now substituted by a rigid ring.
- the He-tank is equipped with two rings for the tuner assembly;

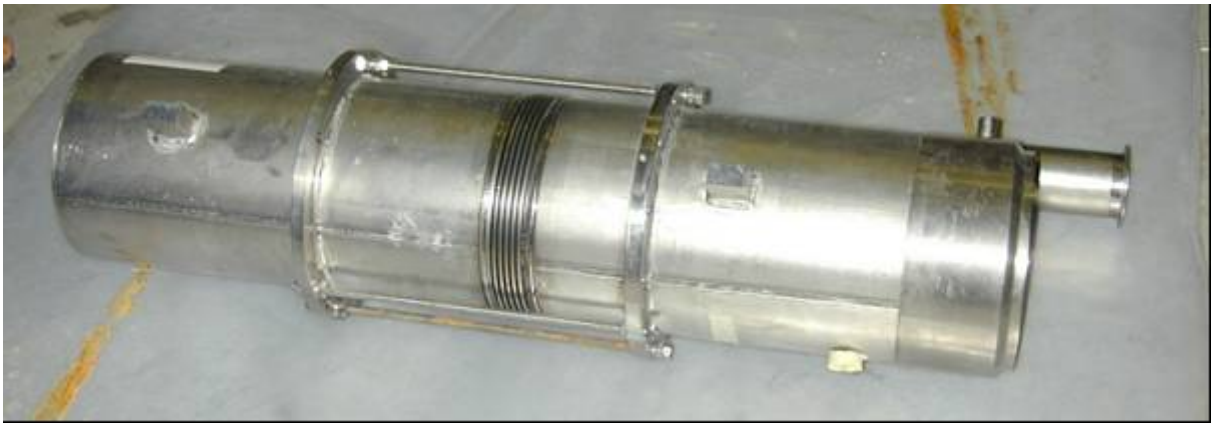
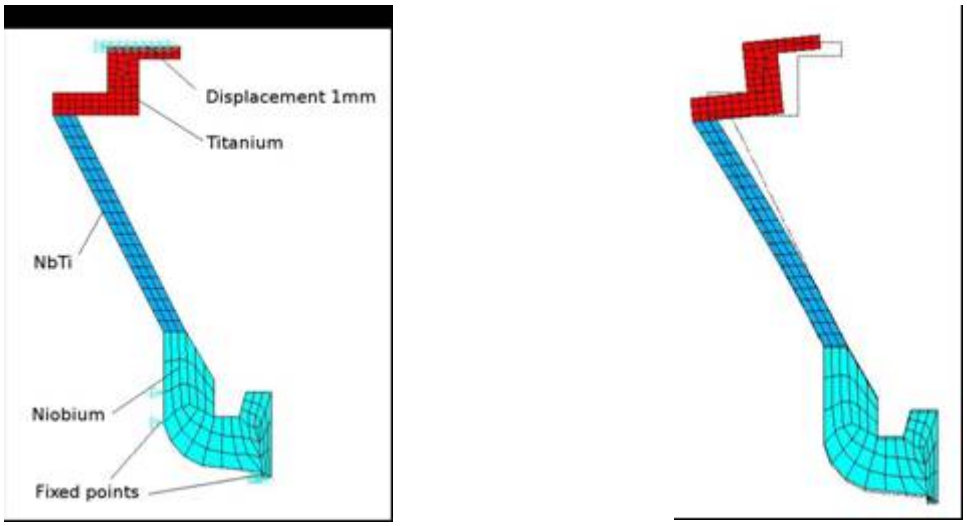


Figure JRA1.2.2: the modified He tank. The support screw rods, visible between welded rings, are temporarily placed to save the bellow from unwanted deformations.

An essential role for what concerns the overall longitudinal stiffness of the assembly is played by the two cones that connect the vessel to the cavity, usually named as end dishes. For the modified He-tank, the end dishes have been adapted from the original TTF design without any optimization. The evaluation of their stiffness has been done by means of the axisymmetric 2D finite element model reported in **Erreur ! Source du renvoi introuvable.**JRA1.2.3a.



a: FE model b: deformation

Figure JRA1.2.3: end dish coupler side.

By imposing a displacement of 1 mm at the model upper edge (see figure JRA1.2.3), the structure reacts with a force that corresponds to an equivalent stiffness k_W^C = 24.8 kN/mm (coupler side) and k_W^T = 32.2 kN/mm (tuner side). The overall longitudinal stiffness k_W of the whole assembly, composed by the series of both end dishes, can be obtained by:

$$k_W = \frac{k_W^C \cdot k_W^T}{k_W^C + k_W^T} = 14\,kN/mm\,.$$

The behavior of the new design was then evaluated inserting k_W and the stiffness of the other elements in the spring model [2]. In particular we were interested to evaluate the effectiveness of the modified He-tank to transfer to the cavity the tuner displacements and forces.
The modified He-tank with the blade tuner was tested at room and at cryogenic temperature to verify the modified design, using cavity Z86 (maximum accelerating field of 24.5 MV/m) [3]. At the time of tests the tuner design was not already finalized, therefore we used a special prototype made of stainless steel and Inconel 718. The full Blade Tuner frequency range was measured and compared with the expected one based on our spring model. The cold tests on the modified dressed cavity equipped with the coaxial blade tuner were successful. Main results have been:

- the validation of our FE model due to the good accordance between the experimental results and the model prediction;
- the experiment proofed that the modified He-tank can be assembled following the experience with the old tank design.
- the highlighting of some aspects that we tried to optimize in the following described proposals.

The first new solution (2.3.2)
A better behavior and less expensive solution can be expected with the introduction of some simplification allowed by the adoption of the coaxial tuner. The first solution (internal number 2.3.2) maintains the reference surfaces used in TTF and XFEL projects, meaning that the tuning and positioning tools remain exactly the same. The main aspect is the removal of the end cell stiffening structure that will allow changing the welding procedures with a reduction of the electron beam welds and of the final cost. Moreover, minor deformations on the end cells are expected during the end group welding process, therefore a simplification of the tuning procedure for the end cells is expected.

The reduction of the number of welds and of the number of manufacturing steps is achieved realizing the whole ring with high RRR Niobium. The technical drawings of the main parts involved in this proposal are reported in the deliverable report [2]. In **Erreur ! Source du renvoi introuvable.**JRA1.2.4 the foreseen welding steps are shown. The main advantage in this solution is that only two loadings in the EB welding machine are required: in the first one the end dish is welded to the NbRRR ring, while in the second one the end cell and the pipe are jointed to the NbRRR ring.

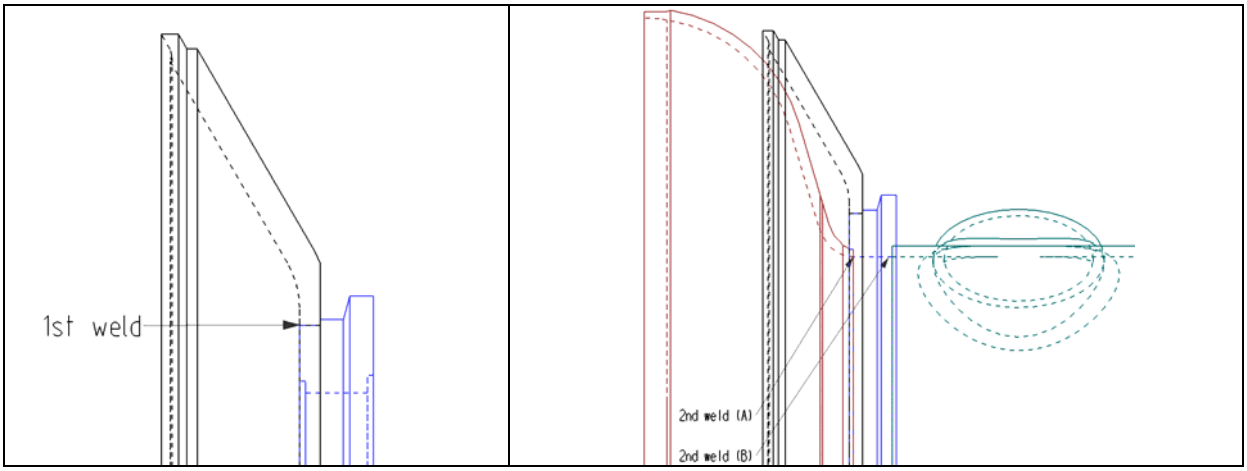


Figure JRA1.2.4: welding sequence.

The compatibility with the lateral tuner is guaranteed since the interface between the end dish and the He-tank is the same of the actually used. In the case of use of the coaxial tuner, the two end dishes can be machined with a diameter larger than the outer diameter of the cavity, thus allowing the direct welding of the He-tank to the end dishes without any intermediate adapting ring (see **Erreur ! Source du renvoi introuvable.**5).

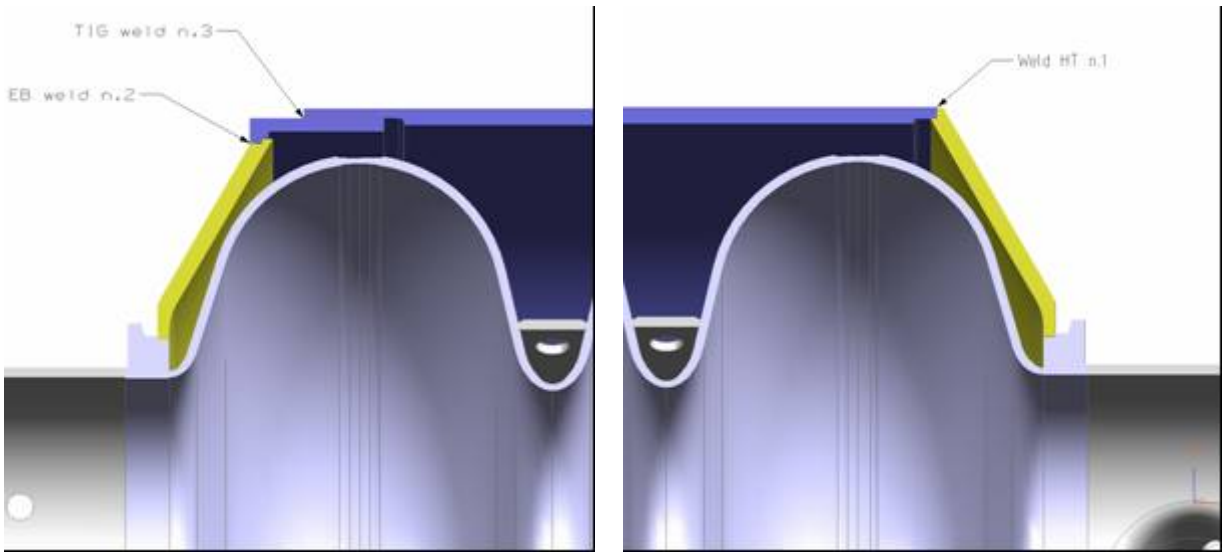


Figure JRA1.2.5: possible solution for the proposal 2.3.2 integrated in a He-tank equipped with the coaxial tuner.

To evaluate this first solution we performed several stress analyses in different load conditions by means of a FE model of the coupler side end group (the same conclusions can be applied to the other due to its similar shape). The numerical model considers all the structural parts between the cavity and the interface to the He-tank, namely the NbRRR ring,

the end dish and the adapting ring. The material properties at room temperature are reported in Table 2.1.

Material / Item	Ex (MPa)	ν	f_y (MPa)	E_{tang} (MPa)
Nb RRR / ring	102700	0.38	40[4]	2080
NbTi / end disc	62055	0.38	480	---
Ti Gr2 / adapting ring	105000	0.38	275	---

Table 2.1: material properties.

The analysis has been performed applying a force of 8667 N at the top of the adapting ring. This force corresponds to the maximum action that the coaxial tuner transmits to the cavity at the end of the tuning range [3]. In this analysis the materials have been considered indefinitely elastic and we obtained a maximum displacement of 0.283 mm. The axial stiffness of the end dish at the coupler side is 30.6 kN/mm (8667 N/0.283 mm) (see figure JRA1.2.6).
The maximum stresses in the end dish (258 MPa) and in the adapting ring (88 MPa) are well below the yield limit of the material. The linear elastic analysis shows in the NbRRR a high stress concentration at the interface area: the maximum value is 102 MPa (**Erreur ! Source du renvoi introuvable.**JRA1.2.6). A further analysis, performed taking into account the material non-linearities, allows the estimation of the real maximum stress and the plastic strains area (**Erreur ! Source du renvoi introuvable.**JRA1.2.7, maximum stress 51.5 MPa).

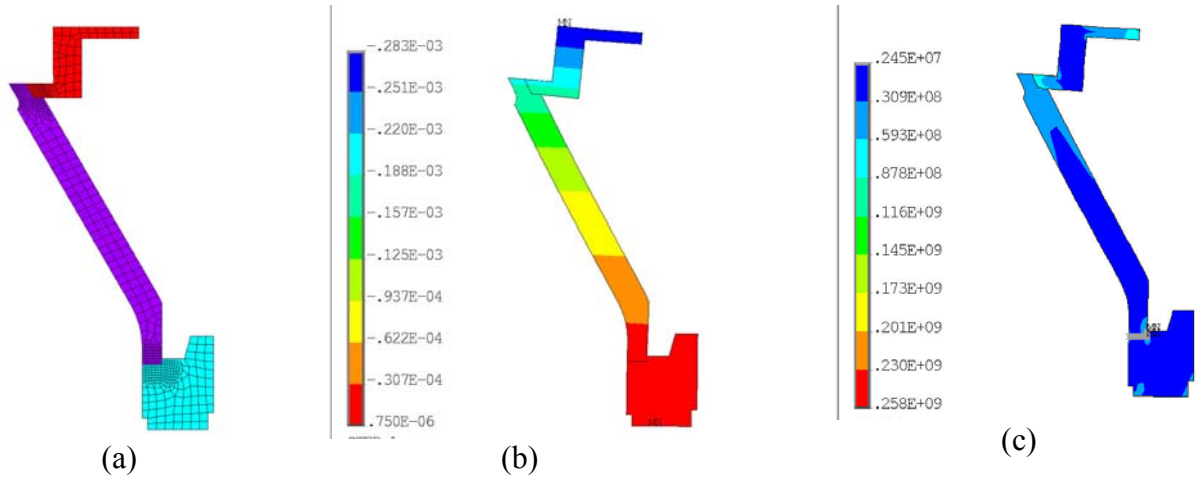
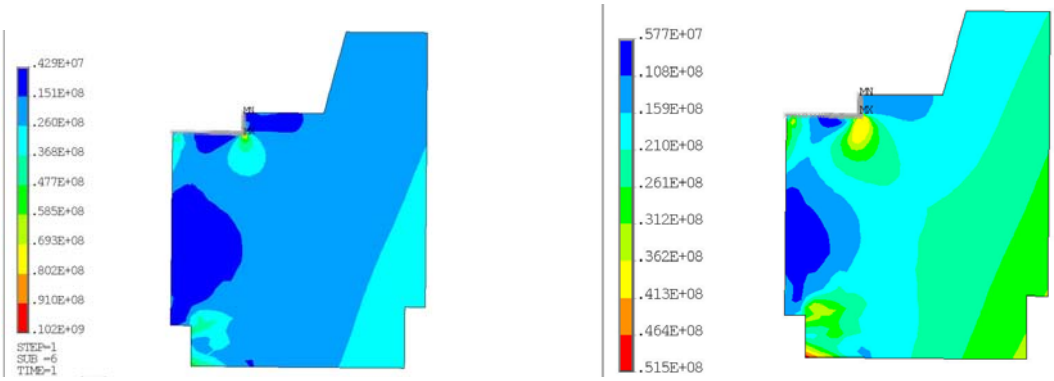


Figure JRA1.2.6: end dish coupler side: (a) FE mesh; (b) displacements and (c) stress for a force of 8667 N.

[4] This value has been obtained from experimental data available in literature and concerning the Nb RRR heat treated at 800 °C (Myneni et al.)



(a) (b)

Figure JRA1.2.7: von Mises stresses in the Nb ring: (a) indefinitely elastic material, (b) bilinear elasto plastic material.

These results are considered as acceptable if we note that:

- the yield limit of 40 MPa is conservative, because it has been obtained at room temperature, while the yield stress at cryogenic temperature is higher;
- the area that exhibits plastic deformations is limited;
- these deformations do not affect the end group stiffness (30.4 vs. 30.6 kN/mm).

The end group stresses have been also evaluated under acceptance test conditions, indeed with the He-tank and the end dishes subjected to an internal pressure of 5.8 bar while the tuner withdrawn a traction of 14000 N. The maximum stresses in the titanium adapting ring (83.4 MPa) and in the NbTi end dish (45.6 MPa) are well below their yield limits. The Nb ring exhibits a small yielded area in correspondence to the weld interface to the cavity, but this does not affect the safety of the structure.

The second new solution (2.5.1)

The second solution we studied is the simplest one, with the reference surfaces moved as in the 3.9 GHz cavity of the XFEL project [4]. This means that the reference surfaces are machined both on the end dish and on the Nb ring, in a different position with respect to the TTF/XFEL solution. In our opinion, this solution should also be the cheapest one, but, as it will be shown, it suffers high stresses in the area of connection between the cavity, the end dish and the end pipe. Also for this solution we propose the removal of the end cell stiffening profile, leading to a reduction of the welding steps and of their costs. As a drawback, this arrangement is not fully compatible with some components such as the existing tuning device, the support systems and the other tools that have to be connected with the actual Nb ring. Furthermore, this solution has been designed to be compatible only with the coaxial tuner, and not with the lateral one. The technical drawings of the main parts involved in this proposal are reported in the relative deliverable [2].

The foreseen welding steps are similar to the ones described for the 2.3.2 solution: also in this case only two loadings in the EB welding machine are required.

The He-tank has been newly designed to be compatible with the coaxial tuner. It is separated in two parts by means of a bellow, and the connections to the end dishes are slightly different from respect to the previous proposal (2.3.2). Details of the connection to the end dishes and of the part that should adjust the cavity and the He-tank length are reported in figure JRA1.2.8.

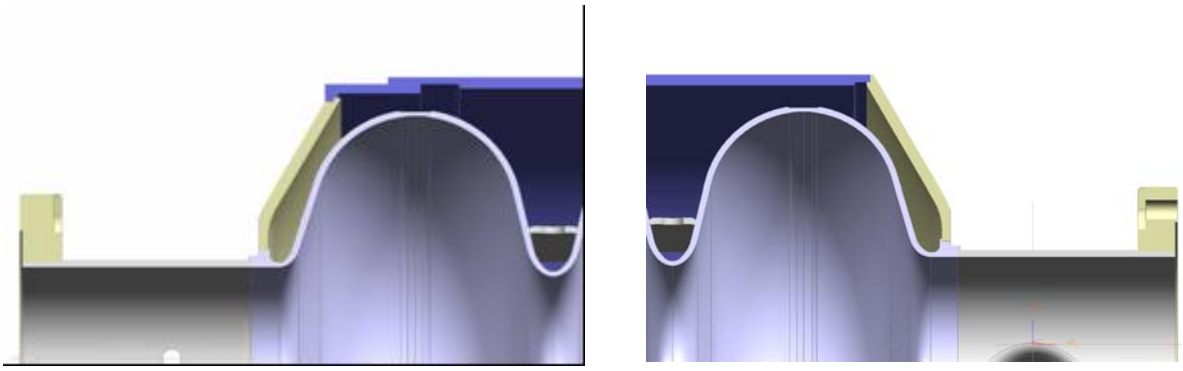
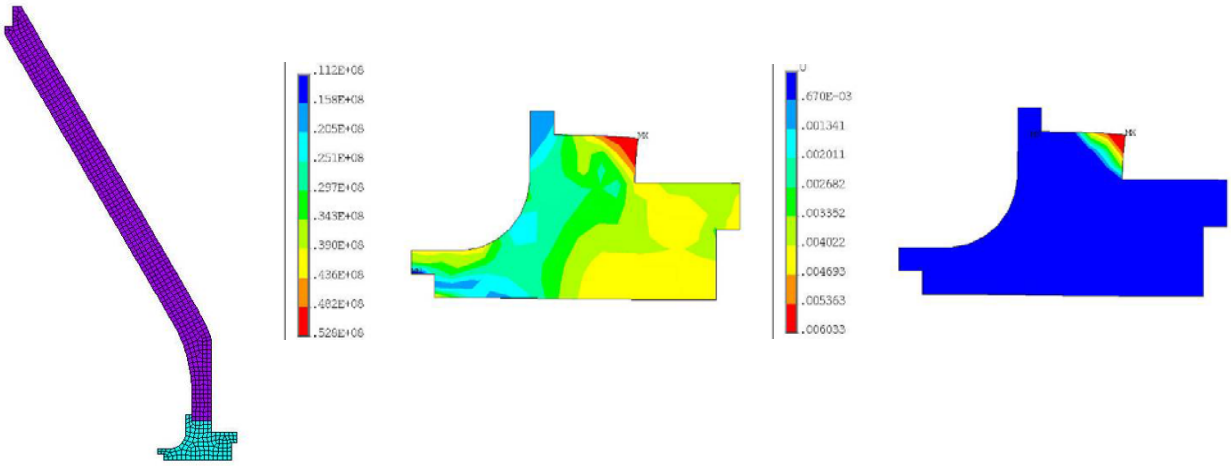


Figure JRA1.2.8: end dish connection to the He-tank and the adapting ring (left); end dish connection to the He-tank at the main coupler side (right).

As for the previous analysis, the deformations and stresses of the end dish in different load conditions have been studied with a FE method. The material properties are reported in Table 2.1 while the axisymmetric mesh is reported in figure JRA1.2.9. Applying a force of 8667 N at the top of the end dish and considering the materials as indefinitely elastic, the maximum displacement obtained is 0.266 mm. The axial stiffness of the end dish at the coupler side is to 32.6 kN/mm.

We obtained a high stress concentration at the interface between the end dish and the Nb ring, due to the difference in the Young modulus of the two involved materials and to the fact that the materials have been considered as indefinitely elastic. The maximum stress in the end dish is

153 MPa, well below the yield limit of the material, but in this case the NbRRR ring area with plastic deformation is not negligible (figure JRA1.2.9 (b) and (c)), maximum stress 52.8 MPa considering the yielding of the material).



(a) (b) (c)

Figure JRA1.2.9: (a) end dish coupler side FE mesh; (a) von Mises stresses in the Nb ring; (b) plastic deformations .

But high stresse occurs at cryogenic temperature and at the higher bound of the tuning range, so that the results are unacceptable for the safety of the structure (plastic strains spread on about half of the welding area). Furthermore, the computed displacement considering the plastic deformations is equal to 0.3 mm, and the stiffness drop to 28.9 kN/mm, 12% less than neglecting the plastic strains. Also for this proposal we evaluated the end group stresses under acceptance test condition, obtaining a maximum stress in the end dish of 79.8 MPa, well

below the yield limit. Anyhow, the Nb ring exhibits plastic deformations in correspondence to the welds, with an extension not acceptable from the safety point of view.

Summary and future tests

Finally, in table 2.2 a summary of the three studied configuration is presented together with main results obtained.

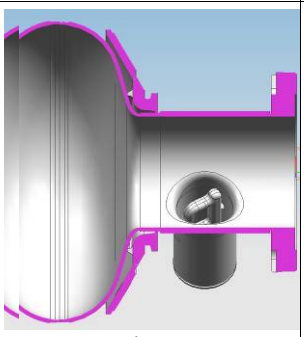
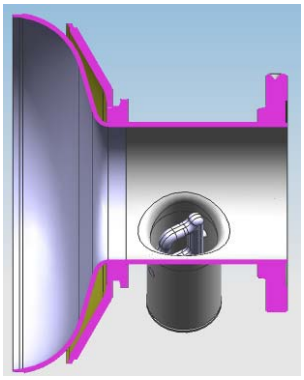
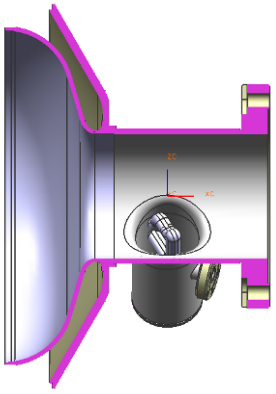
Solution	Combined stiffness	Pro	Cons
 TTF/XFEL	k_W = 14 kN/mm (k_W^T = 32.2 kN/mm, k_W^C = 24.8 kN/mm)	1Existing tools for tuning and supporting 2Chemical treatment of surfaces to be weld can be done without interfering with the NbTi end disc 3Proved geometry	4ring geometry very complicated 5Low axial stiffness 6High number of welds
 2.3.2	k_W = 13.5 kN/mm (k_W^T = 30.6 kN/mm, k_W^C = 24.2 kN/mm)	7Existing tools for tuning and supporting 8The weld sequence is simpler due to the absence of the end cell reinforcing tooth 9Geometry of the ring simplified 10Reduced number of EB welds 11Full compatibility with XFEL helium tanks 12Proved integration procedure into the helium tank	13The Nb ring must be fabricated in RRR 14Low axial stiffness 15The end disc must be protected before the chemical treatment required for the welds 166% more of LFD 17Integration into the helium tank require an adapting ring and the lateral bellow.
 2.5.1	k_W = 16.2 kN/mm (k_W^T = 32.6 kN/mm, k_W^C = 32.2 kN/mm)	18Small and simple ring 19The weld sequence is simpler due to the absence of the end cell reinforcing tooth 20Reduced number of EB welds 21High axial stiffness 22Two reference planes as in 3.9 GHz cavity 23Reduced number of welds for the integration into the helium tank.	24Incompatibility with the existing tools for tuning and supporting 25The end disc must be protected before the chemical treatment required for the welds 26The Saclay tuner can not be installed 276% more of LFD 28Critical for plastic strains

Table 2.2: different configurations examined

Two simplified end groups (first optimal solution – 2.3.2 type) are now under construction and they will be used:

- to check the simplified welding procedure on the new end groups;

- to evaluate the deformation of the last end cells that we expect to be lower (in the actual solution the last end cells are not constrained by the shaped NbRG ring);
- to evaluate the welding shrinkages;
- to measure the axial stiffness of the new end group with an arrangement similar to that reported in **Erreur ! Source du renvoi introuvable.**10 and figure jra1.2.11.

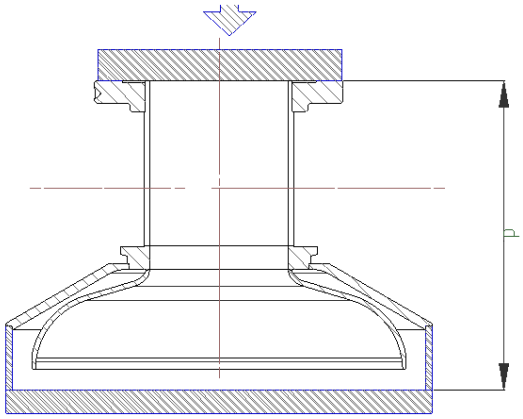


Figure JRA1.2.10: scheme of a possible compression test for the characterization of the end dish stiffness

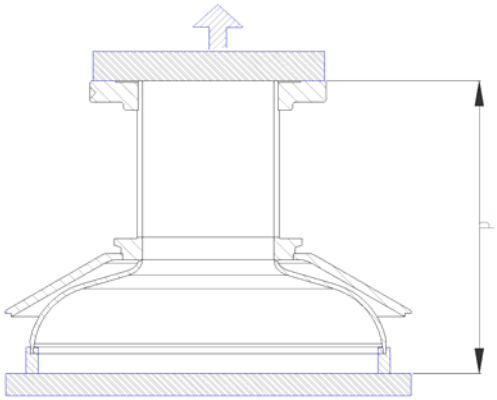


Figure JRA1.2.11: scheme of a possible traction test for the characterization of the half cell stiffness

References

[1] ILC Design report – Volume 3 – The Accelerator (http://ilcdoc.linearcollider.org/getfile.py?docid=182&name=ILC_RDR_Volume_3-Accelerator&format=pdf)
[2] P. Michelato, L. Monaco, N. Panzeri, "2.2.5-Report on the Fabrication of New Cavity", CARE Report – 2008-038-SRF.
[3] A. Bosotti et al., "The Coaxial Blade Tuner – Final Report and Evaluation of Operation", CARE-Report-2008-018-SRF, 2008.
[4] P. Pierini et al., "Third harmonic superconducting cavity prototypes for the XFEL", THP019 - proc. LINAC2008,.Victoria, British Columbia, Canada, 2008.

WP 2.3 EB welding

In the last three years we have investigated the optimal welding parameters for electron beam welding of niobium 9-cell cavities. At first we started with single cell cavities and optimize the parameters for equator and the iris seams. Next activity covered welding 3-cell cavities including dumbbell welding. Finally we completed the study by exploring the welding parameters of complete 9-cell cavities including the welds of the so called conical head disc which connects to the cavity with the helium tank.

The quality of the critical equator welds of Niobium cavities were tested with many single cell resonators in the years 2007 and 2008. The welding procedure consists of a first "degassing" weld followed by the full penetration weld. Those cavities reached accelerating gradients up to 39 MV/m.
Table 2.3.1 summarizes the welding parameters for the major welds at the cavity and auxiliary components. These data can be used as reference for high voltage welding machines. The optimum values might need some fine tuning related to different design of other welding machines but should serve as a good set of starting parameters. The main parameters like beam voltage, beam current and welding velocity should be general parameters, working nearly in all machines. The lenses current only is a hint for other operators to put the focus over, under or on the surface of the pool crater.

task description	**Parameter**								
	UB	IB in mA		V in mm/s		Δ IL in mA		AC	
	KV	f. w.	p. W	f. w.	p. W	f. w.	p. W	in mm	Hz
beam tube on DESY-flange NW78 (one cell9) (vacuum side) 37°	150	4	5	8	5	-15	-40	0	–
beam tube on DESY-flange NW78 (backing) 37°	150	4	8	8	6	-15	-40	-/1.5	4000
iris internal 37° (68%)	150	–	8	–	6	–	-25	1,5	4000
iris external 0° (56%)	150	–	7	–	6	–	-25	1,5	4000
equator external	150	7	13	6	6	-45	-45	1,5	4000
frame fixture ring under 37°	150	–	10	–	7	–	-35	1	4000
spot weld in general	150	–	4–5	–	0	–	-20	0	–
tack weld in general; length 15°	150	–	5–6	–	6	–	-20	0	–
nozzle pick-up	150	8	15,5..12,2	10	10	-15	-40	0	–
pickup-flange	150	3	3,5	3	4	-20	-40	0	–
u-section on gun top cover	150	–	17	–	8	–	-35	1,5	4000
internal dumbbell weld 45° (70%)	150	–	8,5	–	6	–	-25	1,5	4000
External dumbbell weld 0° (56%)	150	–	7	–	6	–	-25	1,5	4000
equator and gun top cover internal 34°	150	9	14	6	6	-45	-45	1,5	4000
equator and gun top cover external 0°	150	7	13	6	6	-45	-45	1,5	4000
coupler housing –"f"-part	150	–	19…7	–	12	-30	0,5	0,5	1000
Titanium ring to conical disc "penetration weld"	150	–	14	–	30	–	0	0,4	80

Titanium ring to conical disc "cosmetic weld"	150	–	9	–	10	–	-100	1,2	10

Table 2.3.1. Main parameters of the DESY EB installation

V	welding velocity	**p. W**	penetration weld	**Δ IL**	difference to surface focus
IL	lenses current	**IB**	Beam current	**AC**	beam function cycle
f.					
w.	fixing weld	**UB**	Beam voltage		

JRA1.3 Work Package 3: Large grain and single crystal cavities

Four single cell cavities 1AC3, 1AC4, 1AC5 and 1AC7 and three nine cell cavities AC112 - AC114 (world wide first nine cell large grain cavities) were produced at Fa. ACCEL. Deep drawing of the half cell was done in the same way as for fine grain material. All half cells were leak tight, but the grain boundaries were noticeably pronounced with steps up to 0.5 mm. It turned out that the steps on grain boundaries can be reduced by applying spinning for half cell fabrication. Half cells for the cavity 1AC5 have been produced by this means. The steps on grain boundaries were less pronounced, but nevertheless clearly visible. Optical coordinate measurement and 3D imaging was applied for estimation of the shape accuracy. Measurements were done at the Fa. DECOM with measurement accuracy of 10 µm on half cells directly after deep drawing, on dumb bells with welded stiffening rings and on end half cell units with welded connecting flanges. The variation of the large grain half cell shape is slightly bigger than for poly-crystalline material. RF frequency measurements show bigger deviations from expected frequency in large grain end cells compare to fine grain, which can be attributed to tooling problems according to ACCEL. However, the frequency deviation and standard deviation for large-grain middle half cells is smaller than for conventional material parts. With appropriate trimming the correct cavity length and the frequency of the fundamental mode in the nine cell cavities AC112-AC114 was achieved without any problems. The deep drawing behaviour for large grain is different compared to fine grain sheets (different spring back) but it is more stable and allows producing more uniform half cells. It has to be mentioned that a big central crystal in the discs is essential to avoid necking and tearing at the irises.

Applied treatment and some RF test results are summarized in table 3.3.1. The best accelerating gradient of approximately 41 MV/m was achieved with the single cell cavity 1AC3 after 150µm EP, 800°C heat treatment for 2h, 40µm EP, baking 120°C 48h, and high pressure rinsing HPR and was limited by quench at the equator. The performance of cavity 1AC5 made from half cells produced by spinning was limited by quench at a lower accelerating gradient compared to deep drawn single cells (1AC3, 1AC4). This limitation is probably related to fabrication issues.

With the three nine cell cavities AC112-AC114 only two preparation cycles and two RF tests were done until now (first test after about 100 µm rough BCP, annealing at 800°C 2h followed by a fine BCP of 20 µm (table 1), second test after additional 20µm fine BCP, baking at 125°C for 48h). During the first test the performance of AC112 and AC114 was restricted by some field emission. The performance of AC113 was limited by quench. T - Mapping inspections of AC113 has detected the quench at the equator of cell 1. However, the achieved accelerating gradients up to 30 MV/m in the three large grain TESLA shape cavities can be considered as a very good result. Already in the first surface treatment all three cavities exceed the specification requirements for the XFEL, namely Eacc=23.6 MV/m with a quality factor $Q=1x10^{10}$. An interesting comparison of these results with the performance of polycrystalline niobium cavities treated similarly during the TTF project is presented in Fig. JRA1.3.1. It can be seen that the average value of Eacc for these large grain cavities is almost by 5-7 MV/m higher than the average Eacc of conventional cavities. The performance of two cavities AC113 and AC114 after additional 20 µm and baking at 125°C for 48 h is shown in Fig. JRA1.3.2. The high gradient Q-drop, which typically is present in fine grain material after bcp surface treatment and disappears after baking only in electropolished cavities, is not present in the large grain cavities (after bcp and “in-situ” baking). It deserves to be pointed out that the steps on grain boundaries were not removed by mechanical grinding. Nevertheless, the cavity performance essentially did not seem to be affected. At the moment both treatments (EP and BCP) have been applied only to a few large grain single cell cavities.

It seems that the EP works more efficiently. More than 10 MV/m were gain during EP treatment on earlier BCP treated cavities 1AC3, 1AC4 (table 1). As a next step the EP will be applied to LG 9 cell cavities.

Material of the company	No./Type	Treatment	Eacc, MV/m	Qo at Eacc=23.5	Limitation
Heraeus/large grain	1AC3/single cell	190µm **EP**, 800°C 2h, 120°C 48h, HPR	41.2	3.2E+10	Quench at equator
		52µm **BCP,** 133°C 48h	28.5	1.2E+10	Quench
Heraeus/large grain	1AC4/single cell	190µm **EP**, 800°C 2h, 120°C 48h, HPR	38,5	2.3E+10	Quench at equator
		41µm **BCP,** 135°C 48h,	28,2	1.2 E+10	Quench at equator
Heraeus/large grain (spinning)	1AC5/single cell	190 µm **EP**, 800°C 2h, 135°C 48h, HPR	29.7	2.0E+10	Quench, not equator
		85µm **BCP**, 127°C 110h	30.3	2.1E+10	
Heraeus/large grain	1AC7/single cell	220µm **BCP**, 800°C 2h, HPR, no baking	25.2	1.5E+10	Quench
		100µm**EP**, 120°C 48h, HPR	25.3	3.0E+10	
Heraeus/large grain	AC112/nine cell	**100 µm BCP**, 800°C, **20 µm BCP**, HPR	30,5	2.0E+10	Field Emission FE
Heraeus/large grain	AC113/nine cell	**100 µm BCP**, 800°C, **20 µm BCP**, HPR	27,4	2.0E+10	Quench at equator
Heraeus/large grain	AC114/nine cell	**100 µm BCP**, 800°C, **20 µm BCP**, HPR	28.7	2.1E+10	Quench probably FE induced

Table 3.3.1 : Summary of RF test results

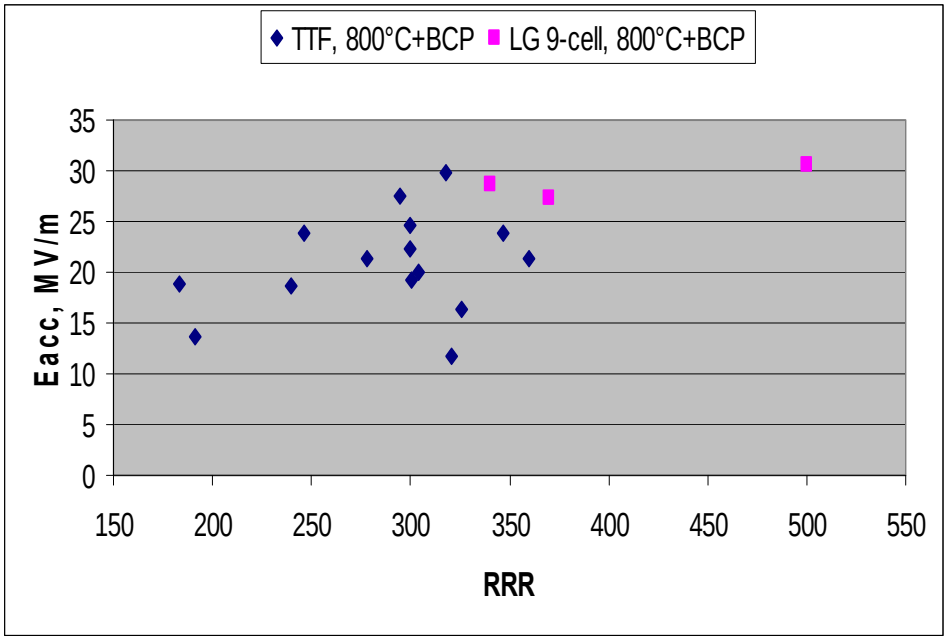


Figure JRA1.3.1: Comparison between large grain cavities RF results and performance of the cavities from polycrystalline niobium similarly treated during the TTF project.

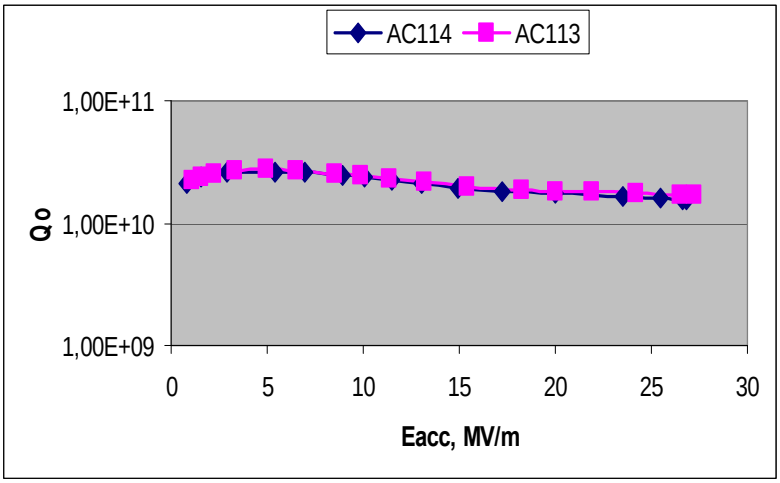


Figure JRA1.3.2: Q(Eacc) curve of the nine cell cavities AC113 and AC114 after second test (additional 20 µm fine BCP and baking at 125°C for 48 h)

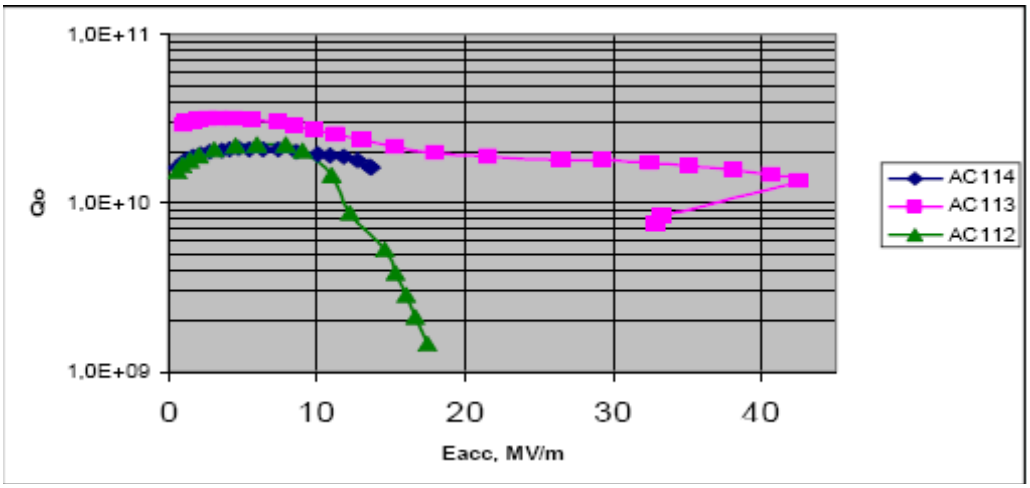


Figure JRA1.3.3: Q(Eacc) of large grain 9-cell cavities (AC112, AC114) after additional 50 µm EP, alcohol rinsing, 800°C, ca. 50 µm EP, alcohol rinsing, High Pressure Rinsing (HPR), ca. 130°C, ca. 50h baking

Single crystal cavity

The high potential of single crystal material SC was recently demonstrated on small single crystal cavities at JLab . A fabrication method for a ILC like single crystal cavity was proposed at DESY. The following aspects are verified on samples and taken into consideration for the fabrication proposal. Definite enlargement of the single crystal disc diameter is possible without destroying the single crystal structure. The single crystals keep the crystallographic structure and after forming of the cavity half cell from a disc by deep drawing the orientation perpendicular to the surface remains. Appropriate heat treatment will not destroy the deformed single crystal. Two single crystals will grow together by EB welding, if the orientation of the crystals is matched. Based on these investigations a prototype single crystal cavity of the TESLA shape was produced. A niobium ingot supplied by W.C. HERAEUS with a single crystal of approximately 150 mm in diameter in its centre was used. Surface treatment and a series of RF tests after successive material removal with BCP were done at JLab. A best accelerating gradient of E_{acc} = 37.5 MV/m was reached after only 112 µm of material removal by BCP and in situ baking at 120°C for 6 hrs with the quality factor of $2x10^{10}$ at 1.8K (Fig. JRA1.3.3). The limitation was caused by a quench. Fig. JRA1.3.4 shows the quench field as a function of the removed surface layer after each material removal step. It is known from experiments on fine grain material that heat treatment

around 800°C provides for hydrogen outgassing and stress relaxation and in many cases an increased accelerating gradient could be obtained. Therefore, as a next step it is planned to anneal the cavity at an appropriate temperature, guided by annealing procedures developed on samples.

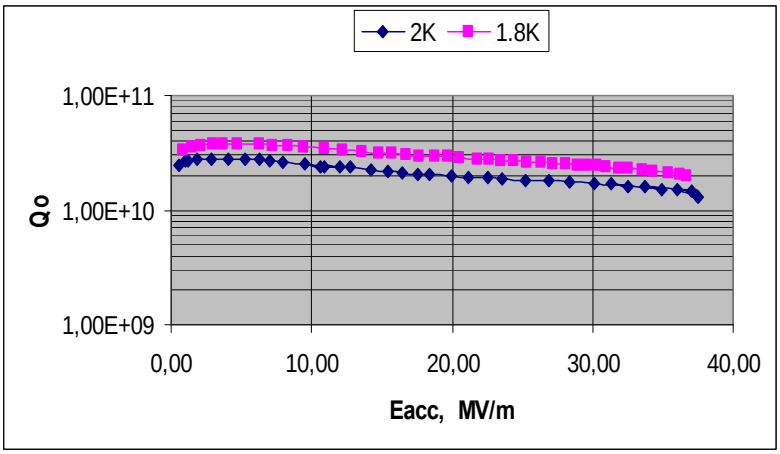


Figure JRA1.3.4: Q(Eacc) curve for the single crystal single cell cavity after 112 µm BCP and in situ baking 120°C for 6 hrs.

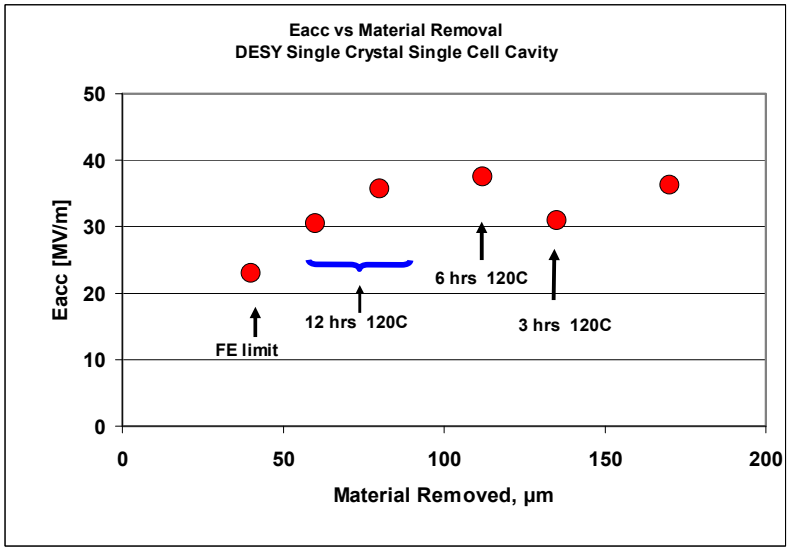


Figure JRA1.3.5: Eacc vs. material removal on single crystal single cell cavity.

JRA1.4 Work Package 4: Thin Film Cavity Production

All activities in WP4 were completed in 2007

JRA1.5 Work Package 5: Surface Preparation

JRA1.5.1 Electropolishing (EP) on multicells

Industrialization of electropolishing

In 2007 the two companies ACCEL and Henkel were selected to build an electro polishing set up for 1.3 GHz Cavities of XFEL / Tesla Shape. The system design is based on the prototype electropolishing equipment at DESY (Figure JRA1.5.1.)

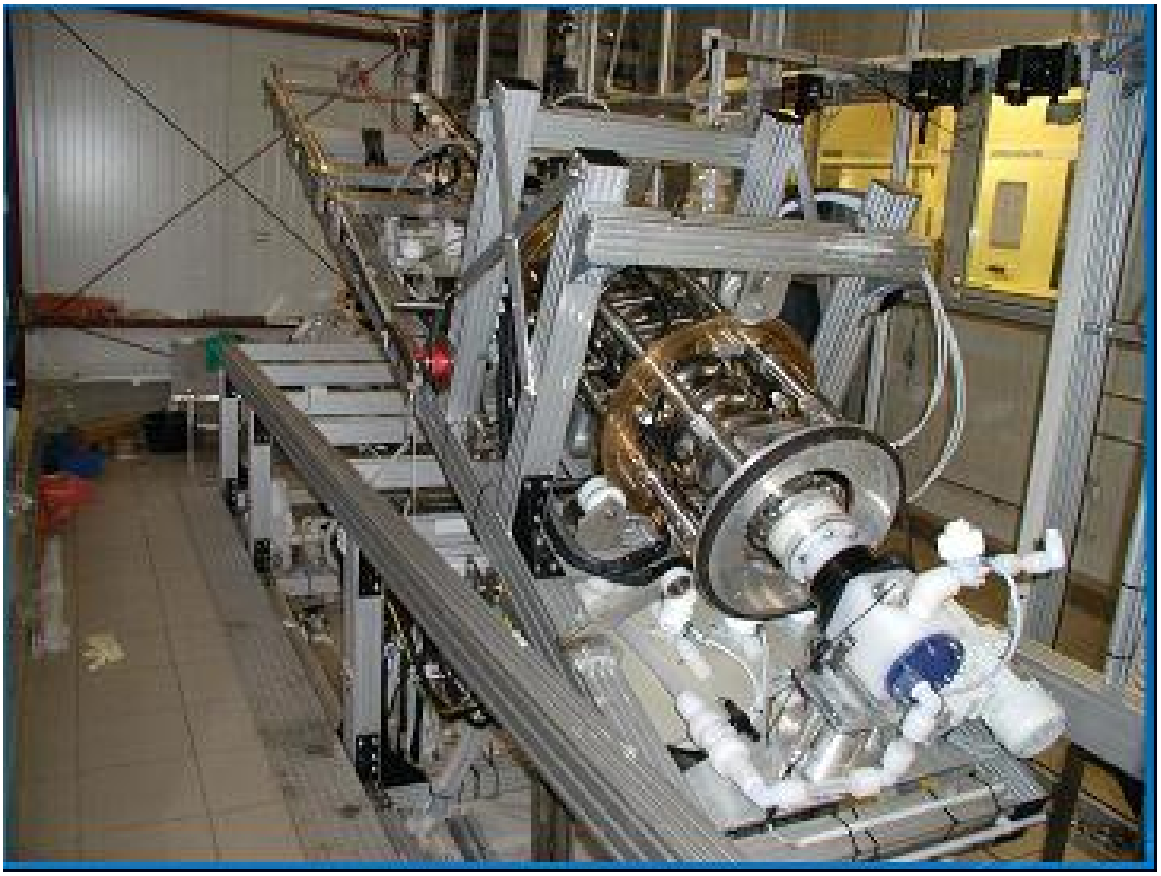


Figure JRA1.5.1: Picture on the DESY electropolishing equipment in the condition of dumping the acid after process ends

The set up were built in 2007 within 8 month in each company. Commissioning took place at the end of 2007 and beginning of 2008. The two companies selected two different operation modes of the EP process. The ACCEL company followed the DESY recipe of constant voltage mode and usage of acid up to a contamination of 10 -15 gr of dissolved. The Henkel company operates the EP process in constant current mode and renews the acid after each treatment.

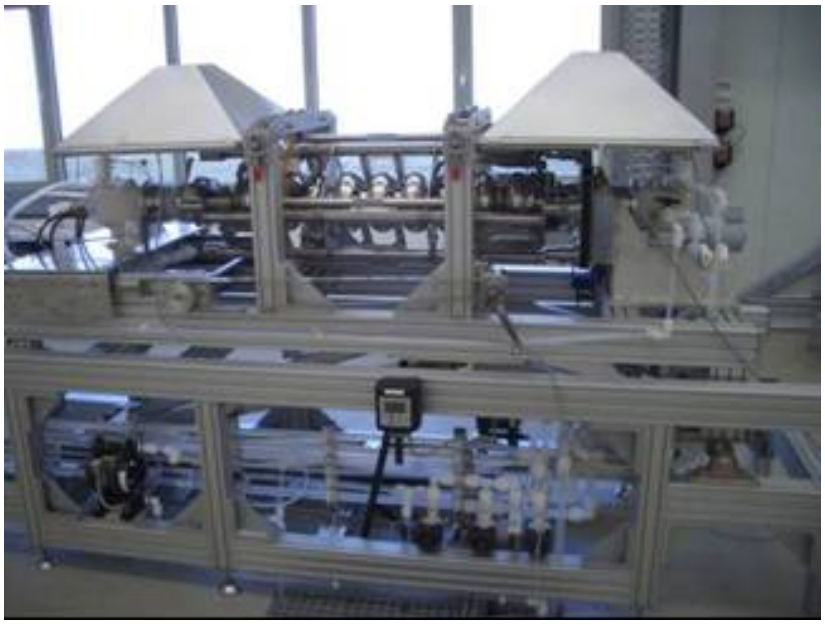


Figure JRA1.5.2: Industrialized EP set up at Henkel Company in Neustadt Gelwe Germany

The electropolishing / chemical cleaning cycles for Niobium cavities consist of the following steps:
1, main removal of about 140 μm (so called damaged layer) by electropolishing
2, final removal of about 40 μm by electropolishing as last cleaning cycle
3, or final removal of about 10 μm by chemical polishing as last cleaning cycle.

As first training step for the industry only step 1 was done for two times 15 cavities. The final and critical (with respect to cleanliness) steps 2 and 3 were done by DESY. In the future the complete sequence (1+2 or 1+3) will be done at industry as part of the cavity production for XFEL.

Figure JRA1.5.3: *Industrialized EP set up at ACCEL Company in Bergisch Gladbach Germany*

JRA1.5.3 Dry ice cleaning

Results on Cu RF gun cavities and auxiliary components

Up to now two gun cavities have been cleaned. While the second cavity is not measured yet, the first one (Gun 4.2) showed excellent results. On the processing stand it showed a factor of 10 less dark-current compared to former gun cavities cleaned with previous HPR cleaning procedures (Figure JRA1.5.4).

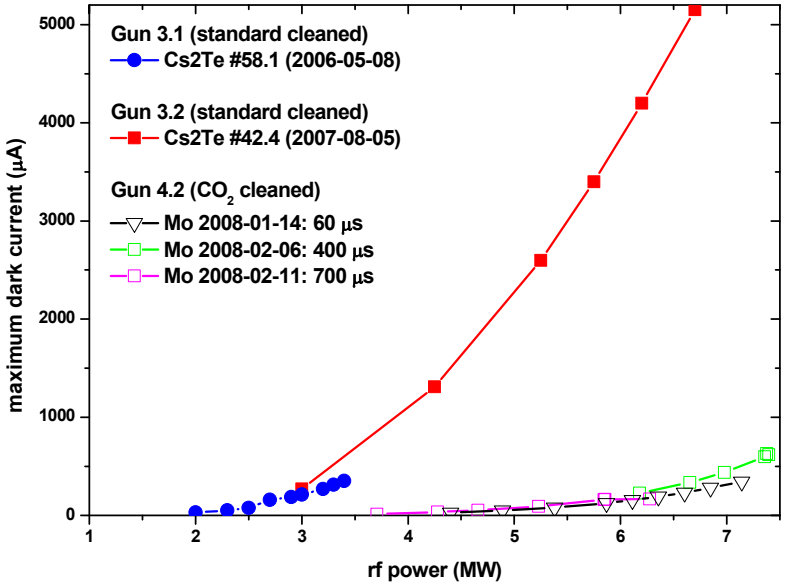


Figure JRA1.5.4: Dark current vs. RF power during processing of different gun cavities.CO_2 cleaning of gun 4.2 results in a significantly reduced dark current compared to previously applied HPR

In addition to the gun cavities auxiliary components like waveguide input coupler and waveguide connector have been cleaned. In order to ensure a clean surface of the cathode plug (Figure JRA1.5.) before coating with the sensitive Cs_2Te also the plug has been cleaned.

Figure JRA1.5.5: Cathode plug (in the center) in transport frame

JRA1.6 Work Package 6: Material Analysis

All activities in WP6 were completed in 2007

JRA1.7 Work Package 7: Couplers

JRA1.7.1 Couplers

Work-package 7 of JRA1 concerns the development of power couplers. This WP is broken down into three main tasks:

7.1 – New proto-type couplers.
7.2 – Fabrication of a titanium-nitride coating bench for the coupler ceramic windows.
7.3 – Conditioning studies.

Task 7.1 & 7.3

We have designed two new coupler prototypes named TTF-V and TW60 (Fig. JRA1.7.1) and (Fig. JRA1.7.2). To validate these couplers it was decided to use the 'usual' TTF-III coupler conditioning procedure (see taks 7.1.3). The next step should be the test of these couplers using a conditioning procedure with enough RF power constraints to make them competitive for the ILC project. At present the goal of the WP was the validation studies of these two prototype RF designs and realisation concepts. This has been tested by using the TTF-III coupler processing procedure [1].

TW60 coupler prototypes:

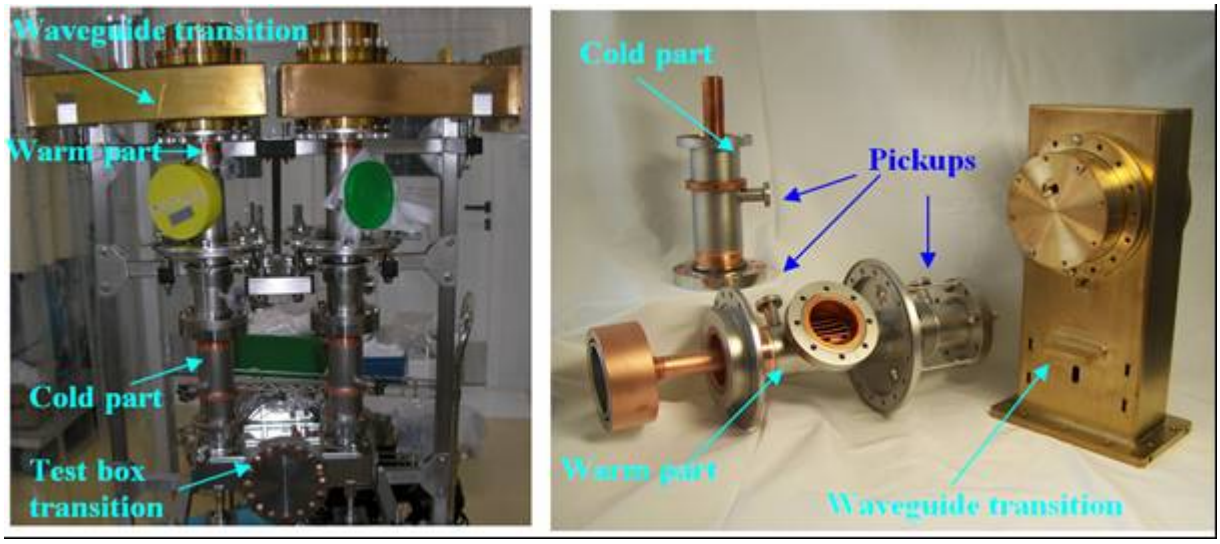


Figure JRA1.7.1: TW60 coupler. The photo at the right shows the main coupler parts. The photo at the left shows an assembly of a pair of TW60 couplers using a test box transition.

The conditioning of the TW60 coupler was restarted after about one year during witch they were stored under an active pumping. The long processing interruption was a consequence of some tricky troubles happened on the HV and electronic facilities. Our first aim was to restart the conditioning from the beginning in order to see if the couplers have conserved their last RF conditioning. We used 20 μs pulse widths with 2 Hz repetition rate. The increase of power was rapid for the first 500kW. Then the vacuum pressure inceased and the power ramping rapidity started to be reduced. At 620 kW the first interlock happened. This power level is very near to the highest power reached during the first part of the conditioning in June 2007 (660 kW). This means that one year of storage under active vacuum have preserved the effects of the last conditioning.

Afterward, the conditioning restarted again. There were a lot of e^- interlocks correlated with vacuum bursts and reflected power (see Fig. (JRA1.7.2)). Also if the vacuum levels were generally very low during the conditioning (< 2 10^{-7} mbar) strong vacuum bursts happened several times. This means that to make conditioning possible we should use very strict vacuum threshold in order to limit the power ramping velocity. e^- currents were also very unpredictable. For these reasons, the operator had to change often the vacuum and the control loop parameters in order to adapt the used processing procedure to each situation in respect to the automatic procedure used for the TTF3 [1].

After some interlocks, the conditioning of the TW60 was achieved for the 20 µs pulses in 23 hours of effective RF power, by reaching 1 MW (the first part of the conditioning performed in 2007 is not considered). The effective RF time showed an acceptable performance with respect to the TTF3 [1] but we have to remark the presence of an important number of interlocks in this first phase at 20 microseconds. The conditioning of this coupler pair was totally finished after 36 hours (about 950 kW was reached for 400µs pulse and more than 500 kW for 1300 µs pulses), (see Fig. JRA1.7.2).

After the first ramp with the 20 µs pulses, in the other longer pulses we noticed a very reduced number of interlocks. However, a small arcing problem was noticed for some pulse lengths for high power levels. These arcs were due to some adhesion problems between the couplers stubs and the waveguide transition walls. These arcs had no influence on the couplers behaviour. Besides, they could be easily eliminated if there will have a next TW60 coupler version.

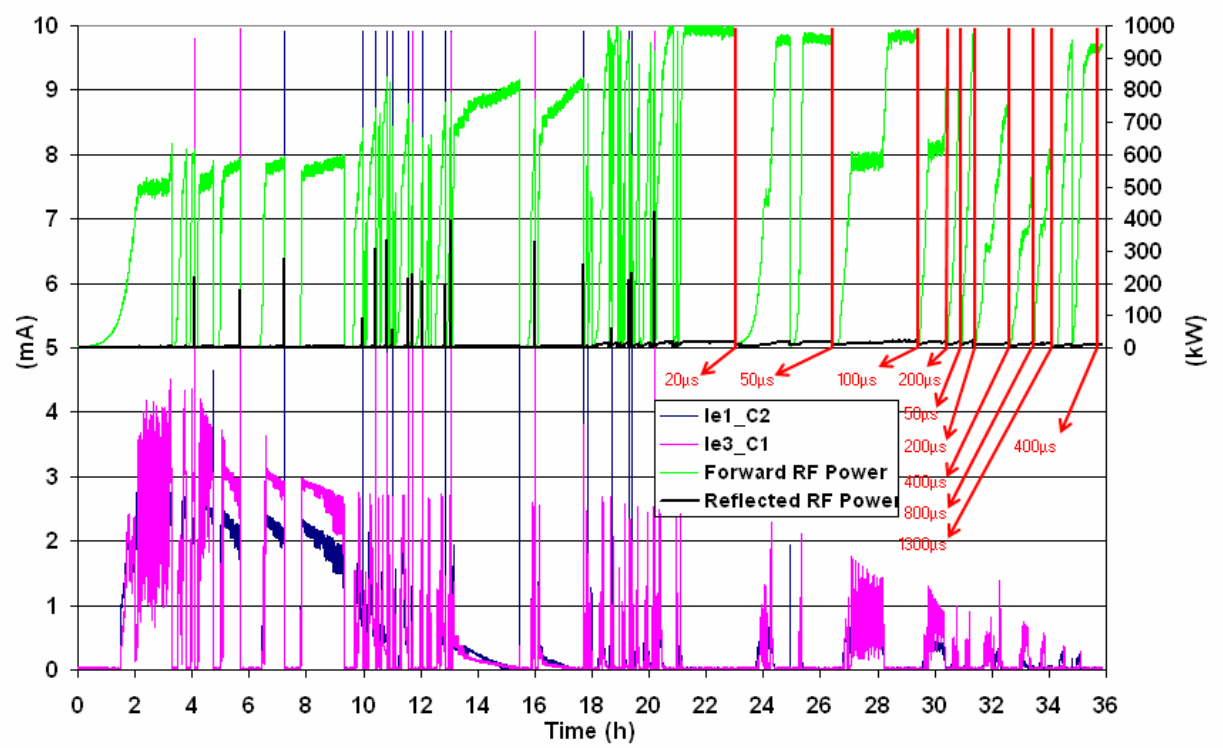


Figure JRA1.7.2: Power variation during the RF conditioning of a TW60 coupler pair in June 2008.

We can see the strong correlation between the e^- currents jumps with the reflected RF power. We only illustrated the behaviour of the e^- current pickup of the cold part in the upstream

coupler (Ie3_C1) and the e^- current pickup near the warm window in the downstream coupler (Ie1_C2), which were at the origin of the majority of the interlocks.

The diagnostics that activated the interlocks were always the same: the e^- current pickup of the cold part in the upstream coupler (Ie3_C1) and the e^- current pickup of the top part of the warm part in the downstream coupler (Ie1_C2). Their signals were correlated with the vacuum behaviour. Since the highest signals were measured always in the same place, we suspect imperfection in these locations more than a systematic multipacting threshold acting at a certain power level.

To clarify this aspect we expect to condition a new pair of TW 60 at the end of 2008 – beginning 2009.

JRA1.8 Work Package 8: Tuners

All activities in WP8 were completed in 2007

JRA1.9 Work Package 9: Low Level RF (LLRF)

JRA1.9.1 Task Stable Frequency distribution

The RF Phase Reference Distribution System (PRDS) must deliver a highly RF phase stable signal to many various RF subsystems of the X-ray Free Electron Laser (XFEL) and in the future the international linear collider. The required phase synchronization corresponding to the short term stability of 1ps must be guaranteed. Taking into consideration large amount of devices to be synchronized, long distances and necessity of delivering different frequencies, the design of PRDS becomes a very difficult and challenging task. This paper describes the main considered issues. Such parameters as distribution frequency, waveguide attenuation, multiplier noise and temperature influence on the system are taken into account. The advantages and disadvantages of coaxial cables and optical fiber as the distribution medium are compared. The feedback system stabilizing long term phase drifts is presented and the structure of PRDS which may fulfill the design requirements is proposed.

Introduction

Large accelerator like XFEL and (in future) the ILC are presently in planning. Both facilities are based on superconducting linear accelerator structures. The basic element of the accelerating structure is 9 cell superconducting resonator cavity. The operating frequency is 1.3 GHz. Groups of cavities are boosted by 10MW klystrons. The low level RF system must assure acceptable amplitude and phase stability so that the electron beam is accelerated properly. In the case of ILC the RF system will be located along the accelerating structure of 33 km length. In addition a phase stable reference signal must be provided. Taking into account the required stability, the distribution distance and the number of synchronized devices (may reach 1000 in the ILC) one will find the design of PRDS very challenging and difficult task, but not impossible.

The reference signal phase stability requirements derive from the low beam energy spread requirement ($\Delta /E < 7x10^{-4}$) and the timing requirement that determines the arrival of bunches at the interaction point [3]. The interaction position should not exceed one bunch length (1 mm). Both requirements lead to the maximum allowed reference signal phase fluctuation of less than 0.5^{o} at 1300 MHz corresponding to the timing error equal 1 ps. The long term stability should not exceed 10ps within days. The main system frequency is 1300 MHz (exactly 1299.9996 MHz but for simplicity the numbers are rounded) but there are several devices that require other frequencies and must be synchronized with the master oscillator of the system. Power level required at outputs of PRDS is 0 dBm or +10 dBm so it was assumed that each output will provide +10dBm.
The next important requirement is the reliability of the system. During 10 years of operation there will be only few days per year allowed for service and repair. This leads to the requirement of less than 0.1% system failures per month which will require accelerator shutdown for immediate repair.

Description of Work

Coaxial cables and optical fibers were considered as the distribution medium. Both have similar phase length versus temperature coefficients ~10ppm although the temperature coefficient in fiber is due to the change in refractive index, not due to the change in physical length as in coaxial cable. The value of coefficients affects the long term stability of PRDS. For example over 15km of coaxial cable the phase of 1.3 GHz signal would drift ~206 $^{o}/^{o}$C

what leads to the temperature stability requirement for the cable equal 0.002 ^{0}C - impossible or at least very difficult to meet. The temperature in the TTF 2 tunnel was measured and we expect 2 – 3 ^{o}C changes per day and up to 10 ^{o}C change over long time – summer/winter. There are also significant temperature variations along the tunnel, especially near the entrances. One could find temperature compensated optical fibers but using it in such a large experiment would lead to unacceptable rise of system costs. Feedback system compensating the phase drifts is required to meet the system requirements. It will be described in the next section. But it must be mentioned here that the system provides phase compensation at the end of the link and since there are temperature variations along the link, the performance may not be met at tap points placed along the distribution line of significant length.
Next important parameter of the distribution medium is the attenuation. For the typical optical fiber this parameter has a low value <0.3 dB/ km which is independent of the RF frequency. The coaxial cable attenuation is high and frequency dependent e.g. 3.6 dB/km at 9 MHz, 11.2 dB/km at 100 MHz and 49 dB/km at 1.3GHz RF frequency for the 7/8" Heliax® type. Therefore the use of coaxial cable is limited to short distances or use of cascaded sections with amplifier at the input of each section. Important are also physical parameters. The optical fiber cable has the advantage that it is much smaller in diameter and its installation is much easier. The next advantage of optical fibers is excellent EMI immunity but in the accelerator surrounding radiation will be present which may affect fiber parameters. This phenomenon will be tested. Considering the costs, the optical fibers is relatively cheap. But the laser transmitter satisfying system requirements (DFB type with thermo electric cooler and temperature controller) and the phase controlling system are relative high. Since optical links are suited for point-to-point operation, the PRDS can not be based only on optical fiber because large amount of links would cause unacceptable cost.

Discussion of Work

For both coaxial cables and optical fibers phase stabilization feedback system can be built based on the detection of the phase difference between signal transmitted into the line and signal reflected from the end of the line. The signal travels back and forth through the temperature sensitive medium. Reflection can be easily obtained by opening the end of coaxial cable or putting a mirror at the end of optical fiber. The signal from the phase detector can be used to adjust electronically controlled phase shifter inserted into the transmission line. There is an interesting scheme of the feedback system for phase stabilization in long optical fiber links. The idea was developed for the SLAC accelerator. The measured output phase change at the end of 15 km fiber link due to a temperature step of 5 ^{o}C was below 2^o X-band (11.4 GHz). The phase step without the feedback would have been 12500 degrees! Considering the 1.3 GHz frequency the phase step would be about eight times smaller – 1560 degrees. Therefore the feedback system would probably ensure stabilization on the level below one degree. But even two degrees satisfy the required short term phase drift requirement of 5 degrees. The performance will be verified very soon in DESY. Interesting component of the system is the optical phase shifter made of optical fiber spool in a temperature controlled oven. It seems to be the best solution for the required range of phase shift. The 1560 degrees RF signal phase shift corresponds roughly to over 6 x10^5 degrees of light phase shift in optical fiber. Such phase changes can not be obtained with the use of commercial optical phase shifters offering maximum delays corresponding to 20 times 2p (7200 degrees). The oven solution seems to be very slow but it has satisfying parameters since the temperature in the accelerator tunnel will drift rather slowly

Conclusions

The most important issues of the RF phase reference distribution system were discussed in the early stage of the design. Such parameters like master oscillator frequency, distribution frequency, noise performance and long term stability were discussed. Coaxial cable and optical fiber were considered as the distribution media. The system will consist of N sections bas ed on coaxial cable supplied by long, phase stabilized optical fiber links using the feedback scheme described above. Each cable section will also include feedback system locking the very end signal phase to the input signal phase. A Test system is prepared for the 300 m long FLASH Facility in order to study issues described in this paper and, if needed, change the system concept

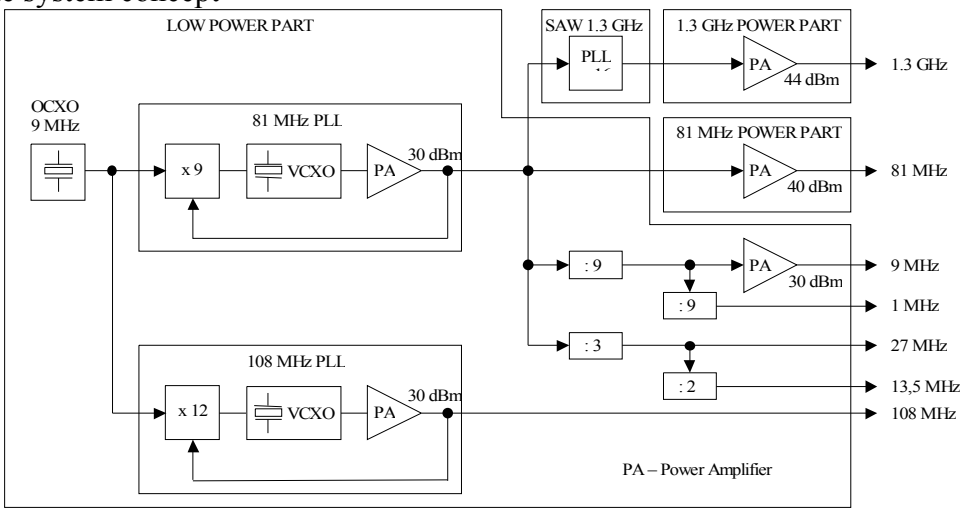


Figure JRA1.9.1: Block diagram of frequency distribution system

Figure JRA1.9.2: Frequency generation and distribution boxes

JRA1.10 Work Package 10: Integrated RF tests in a Horizontal Cryostat

All activities in WP10 were completed in 2007

JRA1.11 Work Package 11: Beam Diagnostics

JRA1.11.1: Beam Position Monitor (CEA)

For the future superconducting accelerators, a beam position monitor (BPM) installed in a cryomodule with a resolution better than 10 μm will be helpful to setup, adjust the machine, and obtain a precise beam handling. Superconducting technology is used for accelerators as the free electron laser in Hamburg (FLASH), the x-ray free electron laser (X-FEL) which will be built in Hamburg, and the International Linear Collider (ILC) project. The FLASH linac at DESY is also used as a test facility for the X-FEL and the ILC study under the name TESLA Test Facility-Phase 2 (TTF2). These projects all share the basic design of the accelerating cavity, based on the TESLA technology.
The reentrant cavity BPM is specially designed to be connected to superconducting cavities which are particularly sensitive to dust particle contamination, and care must be taken to avoid introducing any source of such contamination. This monitor is composed of a radio-frequency reentrant cavity with a beam pipe diameter of 78 mm, four feedthroughs, and electronics which perform signal processing. Its response is linear and accurate; further it can also measure the beam charge.
A first prototype of a reentrant BPM (Fig. JRA1.11.1) has delivered measurements at a temperature of 2 K inside a cryomodule in the FLASH linac. The performance of this BPM was analyzed and the limitations of this existing system clearly identified.

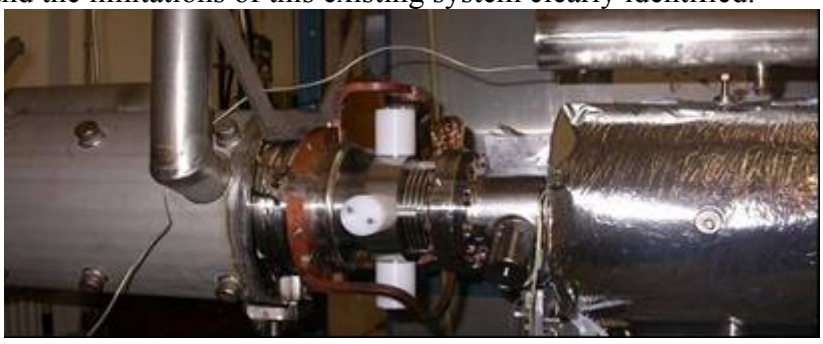


Figure JRA1.11.1: BPM installed in a cryomodule with four feedthroughs protected by plastic cylinders during mounting

The second (Fig. JRA.1.11.2), installed in a warm section of the FLASH accelerator to be tested with beam, sought to address issues raised during the testing of the first BPM.

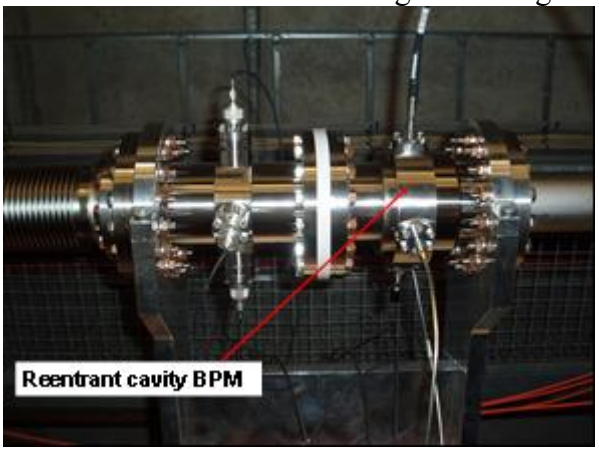


Figure JRA1.11.2: Reentrant cavity BPM installed in the FLASH linac.

This second prototype showed the possibility to carry out some bunch to bunch measurements for the FLASH linac (Fig. JRA1.11.3), a high linearity in the range of ±12 mm (Fig. JRA1.11.4) and has been qualified with beam, achieving 4 µm resolution (Fig. JRA1.11.5) over a dynamic range of ± 5 mm.

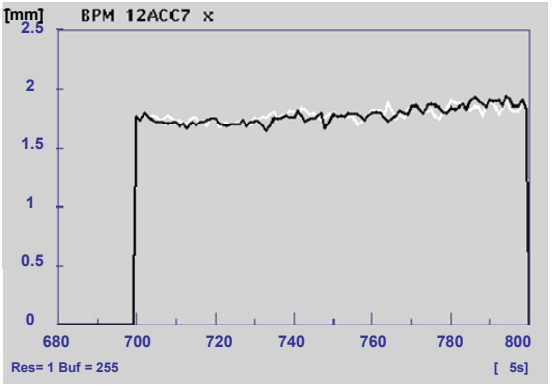


Figure JRA1.11.3: Position of 100 bunches in a macropulse read by the reentrant BPM.

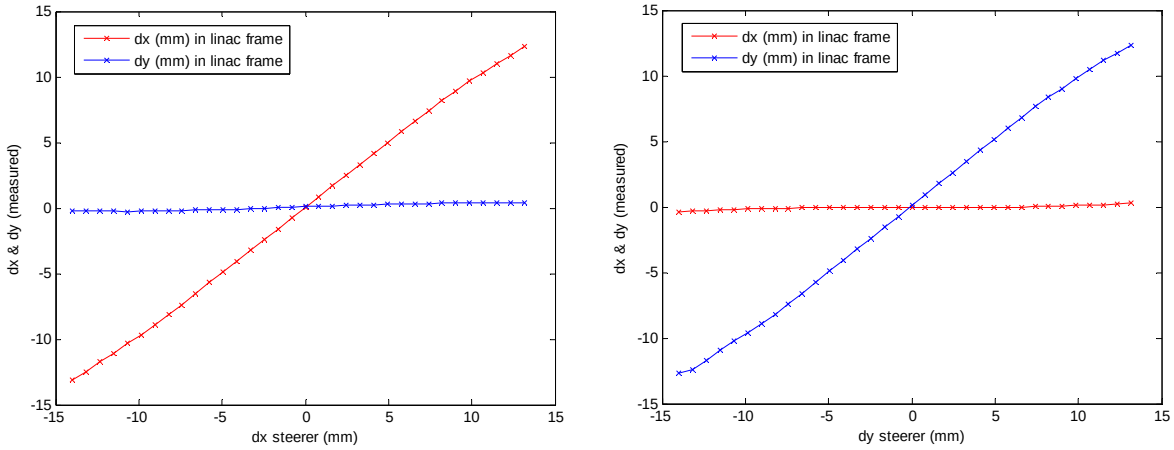


Figure JRA1.11.4: Position read by the reentrant BPM vs the predicted position from horizontal (left) and vertical (right) steerings with 1 nC charge.

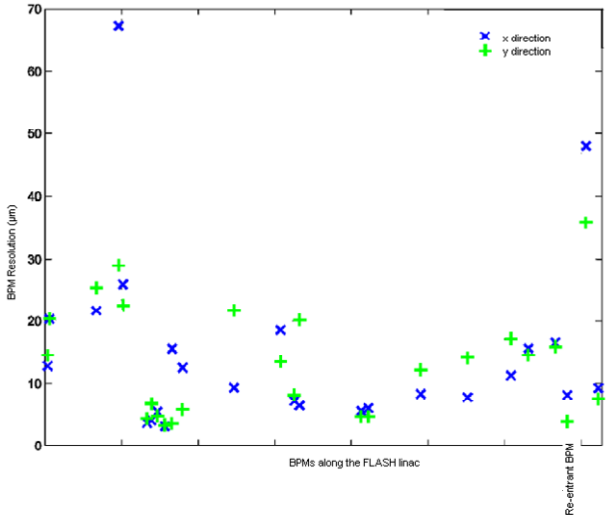


Figure JRA1.11.5: Resolution calculated for the reentrant BPM installed in the warm part of the FLASH linac.

Beam studies continue to achieve a high resolution down to 1µm.

Future work towards a few reentrant cavity BPMs which will be installed in XFEL cryomodules will include modification of the design to improve alignment between the BPM and quadrupole.

JRA1.11.2: Beam Emittance Monitor (INFN-LNF and INFN-Ro2)

JRA1.11.3: Emittance Monitor

Our experimental set-up is placed in the by-pass beam line (Fig. JRA1.11.6) at the OTR57BYP station, very far from the dipole magnets in order to minimize the contribution of synchrotron light. However, the contribution of synchrotron radiation coming from the last dipole and the quadrupole magnets upstream from the radiator cannot be neglected even though in the last shifts a lot of care has been taken in order to optimize the beam transport down to our screen.

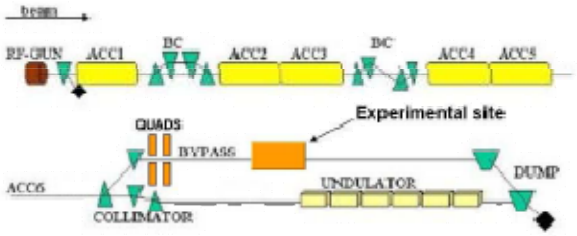


Figure JRA1.11.6: Experimental layout.

The experimental apparatus has an aluminized silicon nitride screen (DR screen) mounted at 45° angle with respect to the beam direction. The DR screen is constructed by lithographic technique starting from a silicon nitride wafer in which two, one of 0.5 mm and the other of 1 mm aperture, are opened by means of chemical etching.
An aluminum layer is then deposited by sputtering on the target to enhance the reflectivity.
To reduce the SR background a stainless steel shield with larger cuts has been installed at 45° with respect to the DR screen and normally to the beam direction (Fig. JRA1.11.7). In this way we have Optical Diffraction Radiation Interferometry (ODRI) as an interference effect between the forward ODR from the shield and the backward one from the screen.

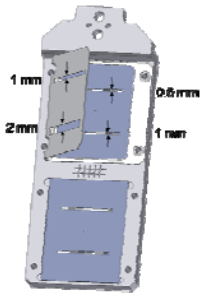


Figure JRA1.11.7: DR target.

Once the beam transport has been optimized in order to achieve a small transverse beam size in both directions, the rms vertical beam size being estimated by the Gaussian fit to be 90 μm, we first looked at the OTR angular distribution to get information on energy and vertical angular divergence.
A complete transverse scan has been done within the slit moving from one edge to the other, as shown in figure JRA1.11.8 (left: ODRI angular distribution image, right: ODRI angular distribution profile). We moved in steps of 25 μm around the slit center. It is clear from the

experimental distributions a different behavior going from the center of the slit to one edge or towards the other due to the fact that the two slits are not aligned.
A strong asymmetry is shown by the ODRI experimental distribution which can only be explained by assuming that the two half planes of the DR target are parallel but not perfectly coplanar. In this case, the field of a particle incident with angle α (in our case, $\alpha = \pi/4$) will be reflected by one half plane earlier than by the other. The phase difference between the two fields, in the approximation of $d \ll \gamma\lambda$ and $\beta \approx 1$, is $4\pi d/\lambda cos(\square)$, where d is the longitudinal difference between the two semi-planes.

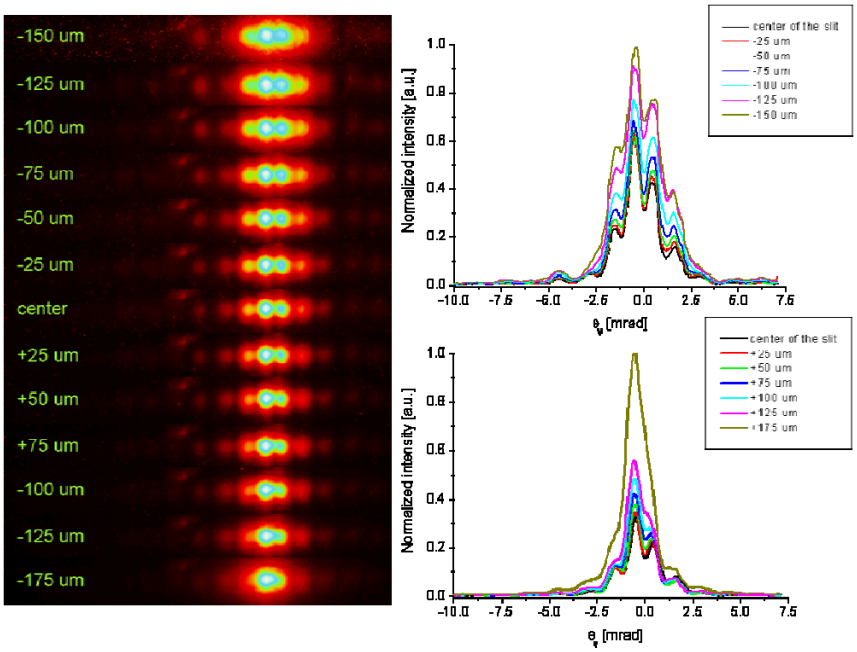


Figure JRA1.11.8: ODRI, transverse scan within the slits.

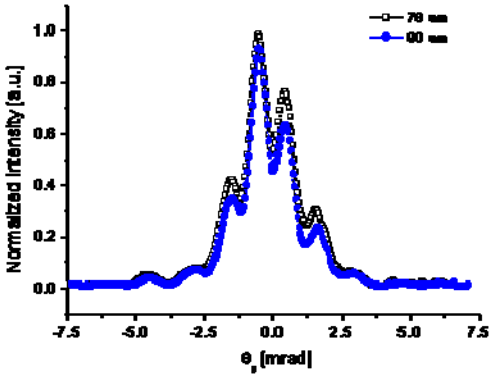


Figure JRA1.11.9: Comparison between ODRI angular distributions for two different transverse size.

In Fig. JRA1.11.9 the comparison between ODRI angular distributions produced by two slightly different beam sizes is shown. The difference in the structure of the two curves is evident, even for such a small variation of the beam size, 78 μm vs 90 μm, demonstrating the sensitivity of the technique.
Finally, in particular machine conditions we detected a strong enhancement of radiation intensity together with strong fluctuations of about 50% shot by shot, which are not compatible with a charge stability of 2%. Furthermore, the ODRI angular distribution shows a different structure that could be explained if only part of the bunch emitted. For these reasons

we are confident that this is **coherent diffraction radiation in the optical region**. Further analysis is ongoing.

JRA1.12 Significant Achievements

- Finalizing the improved cavity/Helium tank design for the coaxial and longitudinal tuner
- Fabrication and testing of three 9-cell cavities made from large grain Niobium material
- Testing of single cell cavities made from single crystal Niobium
- Successful transfer of electropolishing technology to industry
- Production and conditioning of new high power input coupler
- Measurements of the improved emittance monitor in FLASH

1.4.2 JRA2: Charge Production with Photo-Injectors (PHIN)

The list of participants and their implication in the PHIN Work Packages (**C**: Coordination, X: Participation) is given in the table below. The overall management is done by INFN-LNF and by CERN.

Number	Participant	WP1 M&C	WP2 CP	WP3 LASER	WP4 GUN	Person-months
3	**CNRS**	X	X	X	X	135,7
	CNRS-LAL	X	X	X	**C**	
	CNRS-LOA		X		X	
9	**FZR**	X			X	42
10	**INFN**	**C**		X	X	27(6)
	INFN-LNF	**C**		X	X	
	INFN-Mi			X		
11	**TEU**		X	X		5,6
17	**CERN**	**C**	X	X	**X**	12
20	**CCRLC**	X		**C**		0
	STFC-RAL	X		**C**		

Main Objectives: Perform Research and Development on charge-production by interaction of laser pulse with material within RF field and improve or extend the existing infrastructures in order to fulfil the objectives. Coordinate the efforts done at various Institutes on photo-injectors.
Cost:

JRA2.1 Work Package 1: Management and Communication

JRA2.1.1 Meetings

CARE coordinator meeting, CERN, 17 June 2008

Sixth PHIN Collaboration Meeting, Lecce, 17-18 July 2008

CARE Steering Committee CERN, 17 September 2008

CARE Annual Collaboration Meeting CERN, 2-5 December 2008

Seventh PHIN Collaboration meeting, CERN, 2-3 December 2008

CARE Steering Committee CERN, 4 December 2008

JRA2.2 Work Package 2: Charge Production

JRA2.2.1 Description of the work

FZR

Semiconductor photo cathodes as Cs_2Te are sensitive to oxygen and other contaminants, and require a cathode transfer system in which the cathodes can be manipulated and stored in ultra-high vacuum. The system consists of three vacuum chambers: the transfer chamber, the buffer chamber, and the transport chamber. In the system a movable carrier for 6 photo cathodes is located. One of the two manipulators is for the movement of the carrier, and the second serves for the exchange of the photo cathodes in the gun. A photograph of the system is shown in Figure JRA2.2.1 The transfer system has been installed in March 2008 at the SRF gun. A second similar transfer system exists in the photo cathode preparation lab, and the transport chamber can be dismounted, the cathodes are brought from the preparation lab to the SRF gun cathode position.

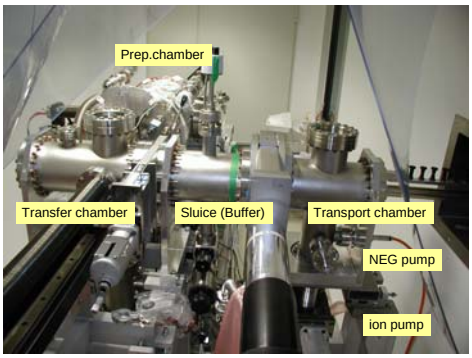


Figure JRA2.2.1: The cathode transport system for SRF gun

During the cathode storage and transportation the vacuum is most important. In Figure JRA2.2.3, the red curve presents the vacuum fluctuating in the transport chamber during the cathode #070708Mo transport. Because of the valve opening, the manipulator operation and the carrier movement, the vacuum can reach $2*10^{-8}$ mbar for several seconds. Although this was a short contamination time, this hurt the Cs_2Te film and reduced the Q.E. from 3% to 0.04%. To improve the vacuum, a NEG pump from SAES has been installed in the transport system between the chamber body and the ion getter pump. This NEG pump doesn't need electrical power after activity, so it is suitable to keep UHV on the way. At the same time, better baking is needed to degas the chamber wall.

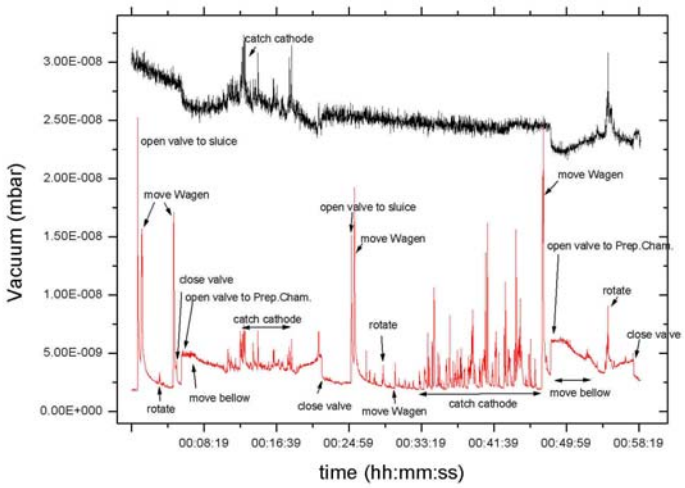


Figure JRA2.2.3: The vacuum fluctuating during the cathode transport (red curve: vacuum in the transport chamber)

After installation of the cathode transfer system, the first set of Cs_2Te photo cathodes for the SRF gun was produced in May 2008 in the preparation lab at FZD. After preparation the cathodes had quantum efficiencies of 4-5 × 10^{-2}. The first Cs_2Te cathode (#090508Mo) was in operation for 44 h until the ELBE shut-down in June 2008. Whereas its Q.E. was 4 % after preparation, it dropped down to 0.05 % after transfer to the SRF gun. Figure JRA2.2.4 shows the Q.E. distribution measured in SRF gun. Laser irradiation was typically with 50 mW at 100 kHz repletion rate. This cathode and all the others of the first set were damaged due to an accidental air of the transportation chamber during the shut down.

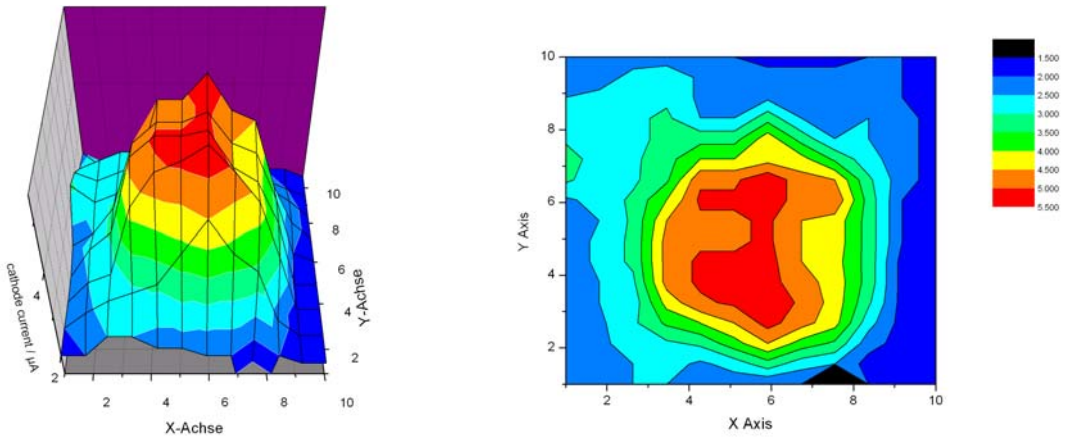


Figure JRA2.2.4: Q.E. map of cathode #090508Mo measured in SRF gun

The cathode #070708Mo was produced soon after the vacuum accident. The fresh Q.E. was 3%, and kept to 3% after one day stored in the preparation chamber. It was inserted in to the SRF gun on 21.July and worked in the gun for two months. A large number of experiments in the beam physics have been done with this cathode, for example, emittance, energy and energy spread measurement, Schottky scan, and so on.

Immediately after the cathode installation the Q.E. was measured, but it was pitifully reduced to 0.04%. And periodic measurement has been done and there was no distinct decrease found in the next two months. Figure JRA2.2.5 is the last measurement result. From the linear fit for

the low laser power range, the Q.E. can be calculated to 0.04%. The history of Q.E. is presented in the Figure JRA2.2.6. After the test, cathode #070708Mo was sent into the preparation chamber again and the rejuvenation has been done on it. After it was heated to 120 °C, the Q.E. increased to 0.7% and kept in this level. Then, the Cesium reactivation was performed and the Q.E. continued to increase till 1.4% and then stopped.

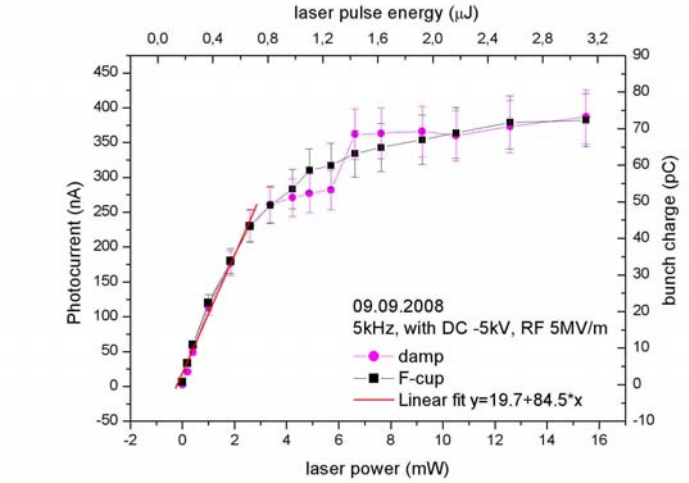


Figure JRA2.2.5: Cathode #070708Mo Q.E. measurement in SRF gun

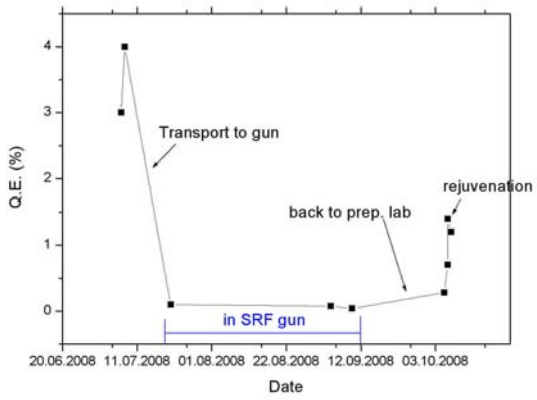


Figure JRA2.2.6: Q.E. history of cathode #070708Mo

The Q.E. maps were measured with and without RF filed in the gun (see Figure JRA2.2.7). The left graph was measured only with cathode bias voltage 4.5kV, and the photocurrent was read from the high voltage generator. The right graph was measured with DC voltage and RF gradient 5MV/m, and the photocurrent was read from Faraday cup. The efficiency distributions from the two maps are similar. The edge of emission area is not so sharp, because the laser spot on the cathode was 2.7 mm diameter, but the emission area is only Ø8mm. A smaller diagnostic laser beam will be built in the next time.

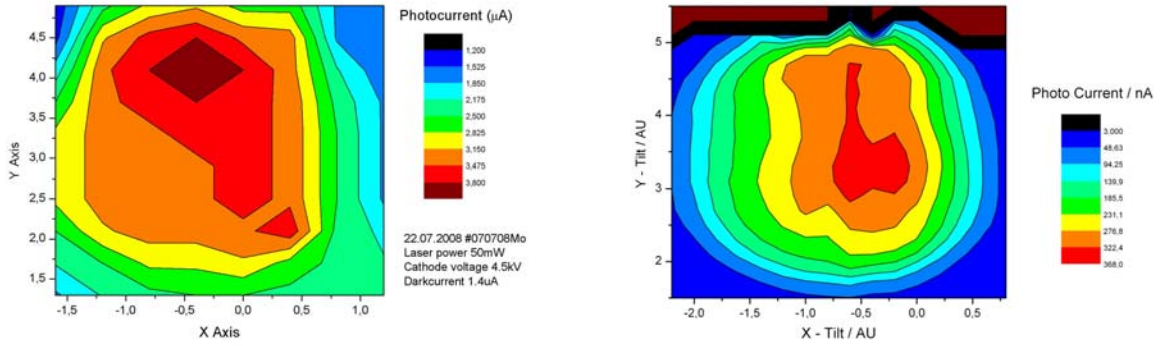


Figure JRA2.2.7: Q.E. maps of the Cs_2Te photo cathode in the SRF gun

The cathode cooling and support system worked properly. The cooling of the cathode with liquid nitrogen was efficient and a temperature increase of the photo cathodes was not observed. The remote-controlled cathode alignment system was tested. But the parameter measurements were carried out only at one cathode position (about 2.5 mm retracted cathode). A cathode position variation and optimization will be carried out in the next beam time in 2009.

CERN

After a number of improvements in the photoemission laboratory, the bake-out of all components in the preparation chamber and the DC gun has been completed. A further CsTe photocathode (No. 167) has been produced using the co-evaporation technique developed at CERN. The quantum efficiency (QE) has been measured in the DC gun at 80 kV (8 MV/m).
It has been re-measured during several weeks, up to 1000 hours after the production of the photocathode. The results are shown in Figure JRA2.2.8. As with photocathodes produced earlier, a rather rapid decline of the quantum efficiency is observed initially, but a stable plateau around QE = 7% is maintained over a long period of time. (The specification request QE=3% for a lifetime of 40 hours in the PHIN RF gun).
This photocathode has been transferred to the transport carrier, where it is stored under UHV conditions. In November the photocathode has been transferred from the transport carrier to the PHIN photocathode manipulator and then in the PHIN RF gun.
Since spring 2008, work in the photoemission laboratory has been reduced, priority being with the installation work for the PHIN RF gun in the CTF2 building.

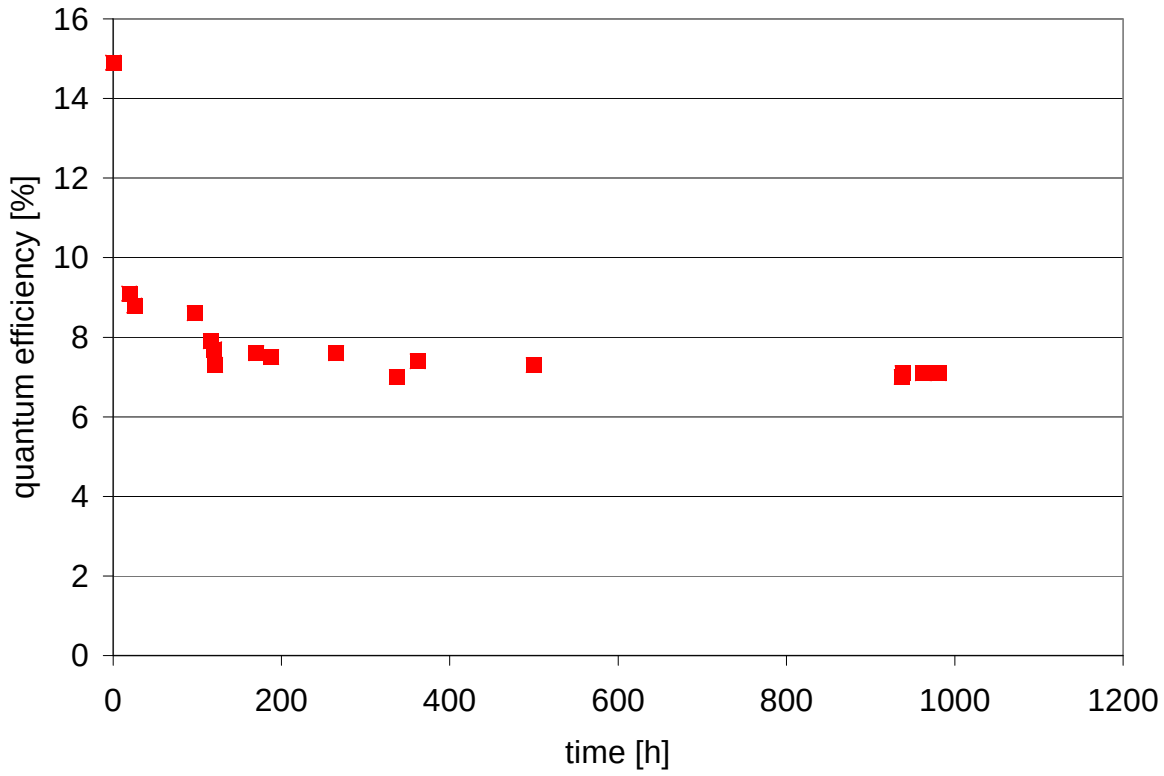


Figure JRA2.2.8: CsTe photocathode No. 167: Quantum efficiency as a function of time after photocathode evaporation (January 2008). This photocathode has been installed in the PHIN gun in November 2008.

LOA

No work has been carried out at LOA for PHIN in 2008.

TEU

It has been postulated that the actual composition in the layered cathode structure is responsible for the observed variations in performance of Cs:Te photocathodes. It would therefore be useful if one can monitor the layer composition and thickness while the cathode is being grown. Combining this data with the quantum efficiency data obtained in the usual way and lifetime measurements either in a test setup or a real accelerator would allow us to check for correlation between cathode performance and composition.
Ellipsometry should be capable of measuring the refractive index and thickness of the cathode layers during the cathode production. Several steps are required to retrieve useful data from an ellipsometric measurement. First one has to determine the so-called Fourier coefficients from the measured signal. From these coefficients one should in principle be able to derive the ellipsometric variables Ψ and Δ using a model for the optical system. A regression analysis is then used to compare the measured Ψ and Δ to a theoretical model. Optical parameters like index of refraction and layer thickness are then adjusted to obtain the best agreement between model and experimental data. Thus the physical parameters are obtained when a good fit is obtained. Separate research is required to link the index of refraction to a certain Cs:Te ratio in a particular layer.

The rotating compensator ellipsometer was tested in combination the existing preparation chamber at TUE. This proof of principle experiment allowed us to calculate the Fourier coefficients. However, as was reported before, the vacuum window in the preparation chamber was not properly characterized and not designed for ellipsometric measurements. We were therefore unable to calculated the Ψ and Δ variables from the measurements. However the Fourier coefficients themselves already showed differences when cathodes were made under different conditions, i.e., different evaporation rates of the Cs and Te. The data analysis showed also that the results were very sensitive to the angles of the polarizer and analyzer.
The preparation chamber and RF accelerator were at this time scheduled to be used for another experiment and were therefore not available for further experiments with Cs:Te photocathodes. We therefore decided to rebuild the ellipsometer using a test sample to verify the operation of the sample and data analysis procedure. The ellipsometer contained several improvements, like switching to an rotating analyzer ellipsometer (RAE) that contained motorized stages for the input and analyzer polarizer and sample holder. The motorized stages allowed for a far better constant rotation velocity, a better positioning due to build in encoders and therefore a better angle determination. Furthermore, special attention was given to the alignment procedure for the various optical components to allow accurate measurement of relative angles. We also designed and build dedicated electronics to synchronize the angle measurement with the detector signal. Eventually, the synchronization pulse in combination with the sample rate of the oscilloscope used determined the actual accuracy of the angle measurement. The schematic of the rotating analyzer ellipsometer is shown in Figure JRA2.2.9a and Figure JRA2.2.9b shows the actual realization in a test setup. The relative angles of the polarizers were measured with an accuracy of 0.05°, which is at least an order of magnitude better with the previous rotating compensator ellipsometer. Note that this is due to the motorized stages and not to the type of ellipsometer. The absolute angle of the polarizers was measured with an accuracy of 0.15° and the sample with an accuracy of about 0.5°.

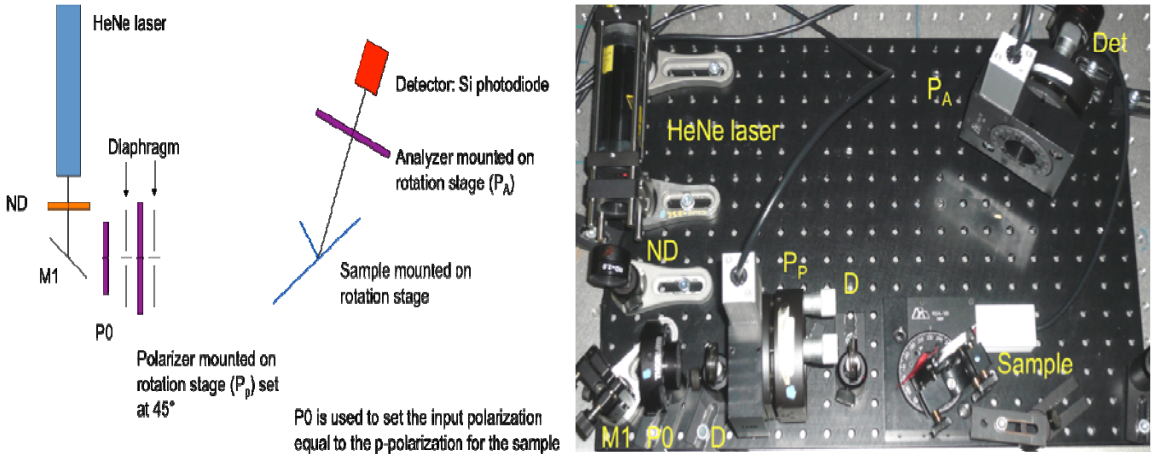


Figure JRA2.2.9: Schematic view of a rotating analyzer ellipsometer (a, left) and experimental realization (b, right)

To test the RAE we used a Silicium On Insulator wafer as a sample. The SOI wafer consists of a 1.5 μm Si top layer, a 3 μm SiO_2 insulation layer and a 522 μm Si substrate. With an angle of incidence of 60°, we expect $\Psi = 24.7°$ and $\Delta=163.2°$ for a wavelength of 632 nm.

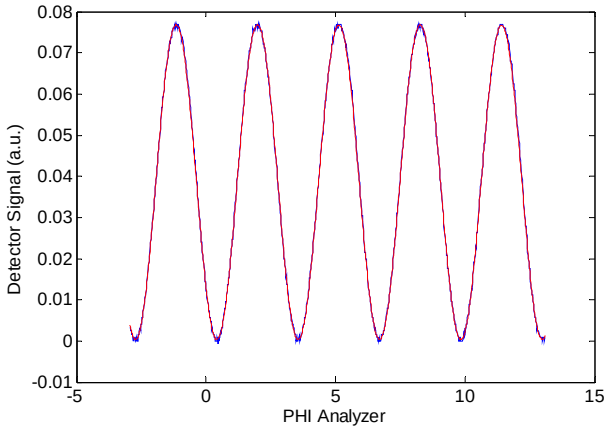


Figure JRA2.2.10: Measured and fitted signals for an RAE.

Figure JRA2.2.10 shows the measured detector signal and the fit according to

$$I(\varphi) = a_0 + a_2 \cos(2\varphi) + b_2 \sin(2\varphi)$$

where a_i and b_i are the Fourier coefficients used to calculated the ellipsometric variables Ψ and Δ and φ is the analyzer angle with respect to the input polarization incident on the sample. For the fit shown in Figure JRA2.2.9, we find Ψ = 24.25° and Δ=168.4°. These values agree very well with the expected values based on the index of refraction and layer thickness of the SOI wafer sample. The measurement accuracy of the ellipsometer has therefore been sufficiently increased for reliable measurements.

When the ellipsometer is to be combined with a preparation chamber or a photocathode gun in an RF accelerator, both the required vacuum window and the fact the ellipsometer must be mounted in line of sight of the cathode may be problematic. We are therefore in the progress of testing a completely novel ellipsometer configuration using fibres to transport the light form the source to the sample and back to the detector. A schematic view of the novel ellipsometer is shown in Figure JRA2.2.11.

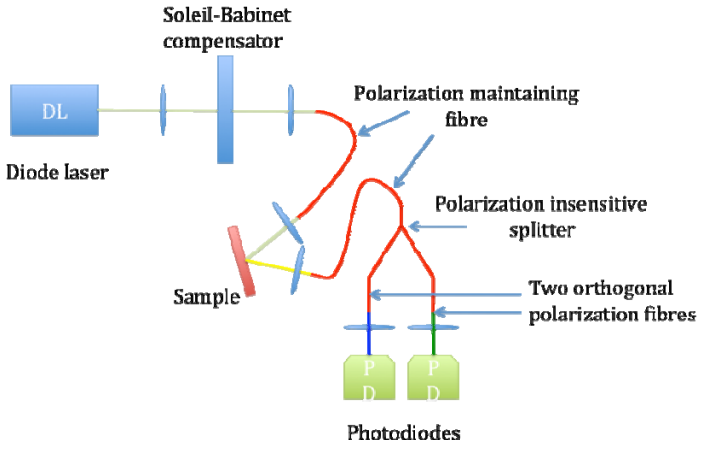


Figure JRA2.2.11: Schematic view of the novel fibre based ellipsometer

The light (1.5 μm) used in this ellipsometer is produced by a pigtailed diode laser. A Soleil-Babinet compensator is used to set any polarization state. Light with a given polarization state is then transported to the sample (photocathode) using a polarization maintaining fibre. The reflected light from the sample is coupled in another polarization maintaining fibre and is then split into two paths by a polarization insensitive splitter. The light in each path is polarized orthogonal to each other by two polarizing fibres and then measured by two photodiodes. The

Soleil-Babinet compensator is set to produce a null signal on one of the two diodes. When the layer thickness and/or layer composition changes, one adjusts the Soleil-Babinet compensator to maintain the null signal on the chosen photodiode. In this way, the setting of the Soleil-Babinet compensator is a measure for the polarization state of the reflected light. With this setup, which is currently under construction, we believe that several problems associated with the RAE and similar ellipsometers can be avoided. Also it is relative simple to have multiple measuring channels in parallel and this type of ellipsometer thus has several advantages.
Characterization of the novel fibre ellipsometer and implementation of either this or the RAE ellipsometer on one of the preparation chambers of CERN or FZD is foreseen in 2009 depending on available personnel.

JRA2.3 Work Package 3: LASER

JRA2.3.1 Description of the work

JRA2.3.1.1 INFN-MI

The R&D on the shaping of powerful laser pulses has been fully completed with the following scientific and technological results:

(1) Tests of the losses at the sections (fiber launch, modulator, fiber beam splitter, fiber-fiber junctions) of the Phase-Coding system of the CTF3-CERN project and of its stability. The test of the principle of operation of the entire Phase-Coding system was also successfully performed.

(2) Exploiting the techniques acquired with the laser pulse shaping, a successful study on the superluminal advancement of a single photon has been performed (to appear in Feb 2009 on the New Journal of Physics with the title "Apparent superluminal advancement of a single photon far beyond its coherence length").

(3) Proposal of a single-shot autocorrelator of new design, based on radiation up-conversion instead of the second harmonic generation, for measuring a single-shot femtosecond 532 nm SPARC-FEL pulse. A note is in progress.

JRA2.3.1.2 INFN-LNF

<u>Pulse shaping</u>

The shaping of ultrafast laser pulses is a research program within the PHIN collaboration has been completed at the SPARC photoinjector of LNF-INFN. The promise of increasing the brightness of electron beams from RF (radio frequency) photoinjectors by using a flat top UV laser pulse to illuminate the cathode is the application inspiring the pulse shaping activity. For optimum driving a photocathode of a S-band RF cavity, such as the SPARC photoinjector, one desires ideally a relatively high energy (> 100μJ) UV laser pulse, 5 to 10 picoseconds long, with a flat top temporal profile having fast (~ 1ps) rise and fall times. Previously different pulse shapers in the IR have been experimentally characterized. The layout is reported in the Figure JRA2.3.1. The pulse shapers are installed after the laser oscillator and before the amplification stages in order avoid energy losses and optical damages.
We tested the programmable dispersive acousto-optic modulator (the DAZZLER) and the liquid crystal mask spatial light modulator (LCM-SLM) placed in a 4-f optical setup. Since these shapers are installed before the amplification and the third harmonic generator, the resulted UV pulse is affected from strong distortions. To improve the rise time of the flat top pulse we specifically designed an optical system based on the UV stretcher. This stretcher is designed in order to have a plane where the input wavelengths are spatially dispersed to introduce a proper spectral amplitude modulation. Beside this apparatus permits, changing the distance between the gratings, the fine control of the final pulse length. This feature is particular useful when one wants to change the electron beam current and explore different photo-injector working points.

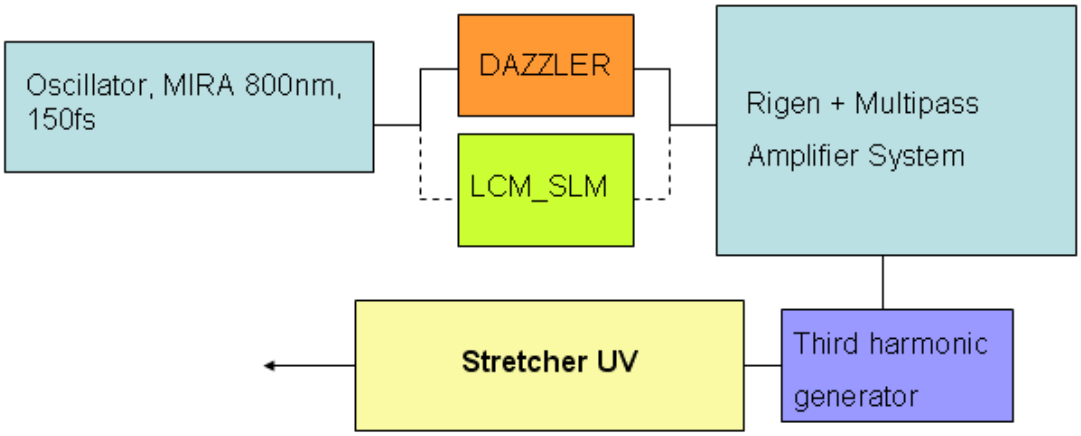


Figure JRA2.3.1: SPARC laser system; the two pulse shapers are easily interchangeable.

The UV stretcher is depicted in the Figure JRA2.3.2. Basically the stretcher is a particular version of the classical *4f* optical scheme with two anti-parallel gratings and two lenses of focal distance *f* respectively separated by a distance *f=50 cm*. A collimated beam is sent onto the diffraction grating and it is angularly dispersed horizontally. The pulse wavelengths are then focused using a positive lens with focal *f*. On the lens focal plane each spectral component will reach a focus in a different position. In other words on this plane there is full correlation between wavelength and transverse position. This allows the cut of the spectral tails and therefore sharp rise time, simply placing an iris at this plane. The beam is then re-collimated by a second lens and sent to another grating which compared to a classical *4f* system is shifted from the symmetry position (which would be at a distance *f* from the second lens) by a distance *h*. The shift *h* introduces a chirp on the outgoing beam and changes the output pulse length. The spectral components are then retro-reflected by the mirror M and retrace back their path through the system.

Figure JRA2.3.2: picture of the UV stretcher realized with transmission grating

As described the laser beam is diffracted 4 times by the gratings. Since the metal coated reflective gratings used so far, have a diffraction efficiency of 60% at the operating wavelength, the overall efficiency is less than 15%. The poor efficiency significantly limits the attainable charge and increases the energy demands on the laser system. At higher energy the laser energy fluctuations becomes larger and, moreover, the probability of optical damages grows significantly.
During the 2008, to enhance the stretcher efficiency the metal coated reflective gratings have been replaced with transmission one. The new gratings are ruled on two mm thick fused silica substrate. The diffractive area is 30 by 30 mm and the grooves density is 4500per mm. The efficiency of this typology of grating is maximized for radiation linear polarized TE and can reach at the Littrow angle 90%. The final efficiency is therefore more than 50%. To rotate the polarization from TM to TE a polarization rotation periscope has been installed upstream the UV stretcher.

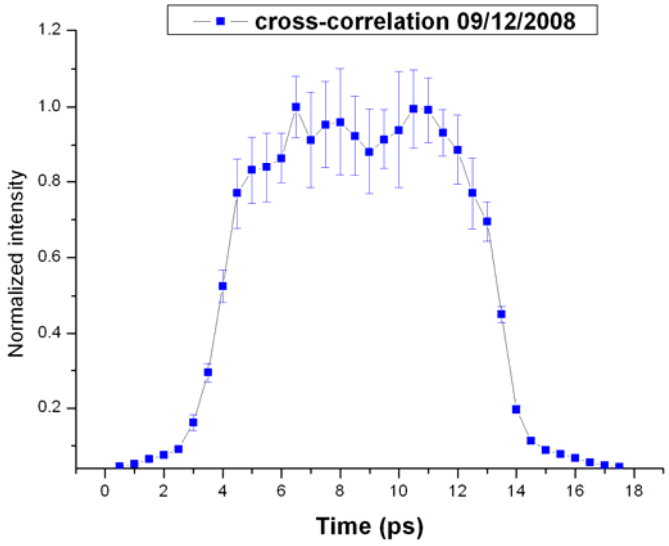


Figure JRA2.3.3: Cross-correlation measurement for UV flat top laser pulse.

The UV stretcher demonstrated the ability to generate fast rise time, flat top beam. In Figure JRA2.3.3. it is reported the intensity profile measured using an motorized cross-correlator. The rise time is of about 1.5 ps and the ripple on the plateau is ±10%.

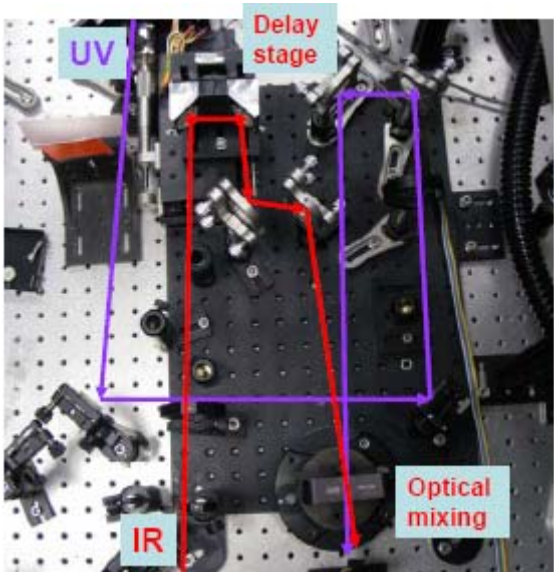


Figure JRA2.3.4: Cross-correlator used for UV time profile diagnostic.

In the cross-correlator the UV stretched pulse and the amplified pulse at 800 nm, whose duration is less than1 ps, are mixed in a BBO crystal. Due to frequency-difference mixing in the non linear crystal a signal at 400 nm is generated. The IR pulse is temporally scanned for the UV profile reconstruction. The IR pulse is progressively delayed using a motorized linear stage, with temporal resolution of 16 fs. A photodiode interfaced with an ADC is used to record the local intensity of the measured profile. In the Figure JRA2.3.4 it is reported the picture of the cross-correlator designed and constructed at SPARC.

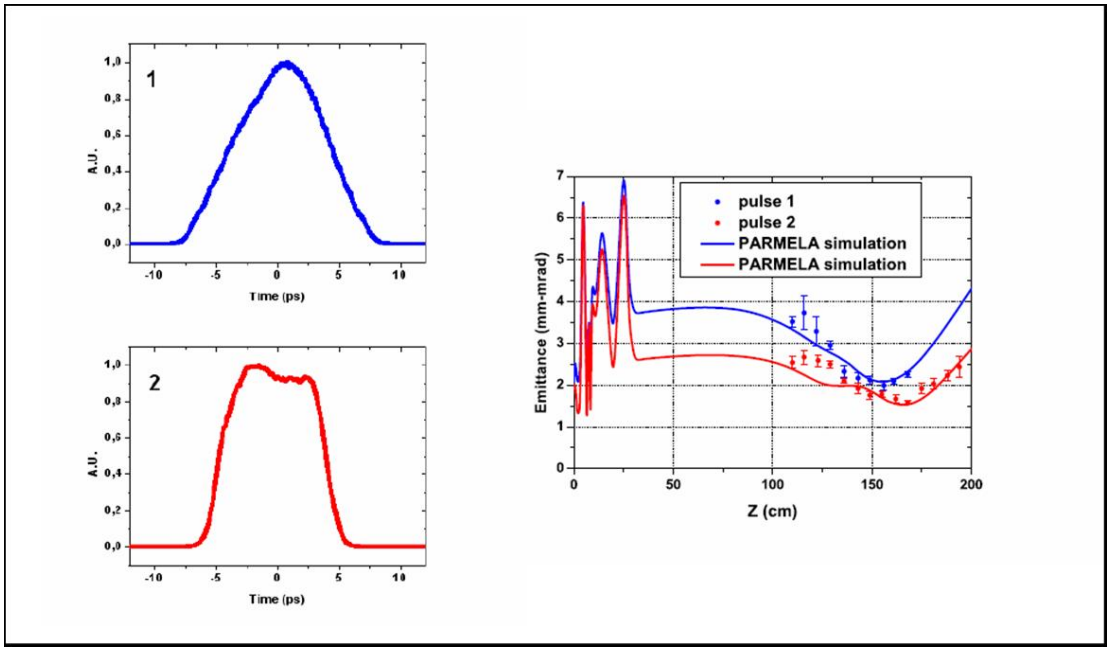


Figure JRA2.3.5: Measured and simulated normalized emittance for two laser intensity profile. The red and blue points are recorded using the red and blue laser profile at the cathode.

The activity on the laser pulse temporal shaping has been completed measuring the electron beam emittance downstream the RF electron gun of the SPARC photoinjector. The electron

beam has been characterized by a movable emittance meter, able to follow the emittance evolution from 1 to 2 meters from the photocathode. The Gaussian and flat top laser have been set for a FWHM of 10 ps and an electron beam charge of 1 nC.
The measured and the simulated normalized projected emittance are shown in the right side of the Figure JRA2.3.5. It is clear that for the flat top pulse, reported on the red curve, the minimum of the emittance is lower than the one recorded starting from a Gaussian pulse (blue curve). The experimental measurement for the emittance (points) is in good agreement with PARMELA simulation (solid curve). More over the measured normalized emittance 1.5 mm*mrad is better than the nominal value specified for the SPARC experiments.

LASER - RF Synchronization

For an optimal operation of a photoinjector the electron bunch should be extracted at a precise and repeatable phase of the accelerating field. For the precise control of the emission the laser should fire in phase with the RF master clock working at 2856 MHz. At SPARC photoinjector, in particular, the required phase stability between the optical and the RF sources is within 1 ps rms.
The optical synchronization between the laser and the RF generator is carried out at the level of the laser oscillator. In fact the amplification, the following beam manipulation and the transport to the cathode are a fixed optical path, which does not introduce a jitter.
The optical path can be affected by thermal drift that can be compensated with a proper feedback loop.
The frequency of the optical cavity of the SPARC photoinjector laser oscillator is locked to the RF reference in a PLL configuration (Synchrolock™ by Coherent). Motorized and piezo-controlled mirrors are used to tune the optical cavity and close the loop.
The repetition rate of the laser pulses is reduced along the amplification chain from 79.33 MHz (RF/36, the frequency of the oscillator optical cavity) down to 10 Hz. The time of arrival of the laser shots after amplification is monitored using a resonant cavity and the electronics shown in the Figure JRA2.3.6.

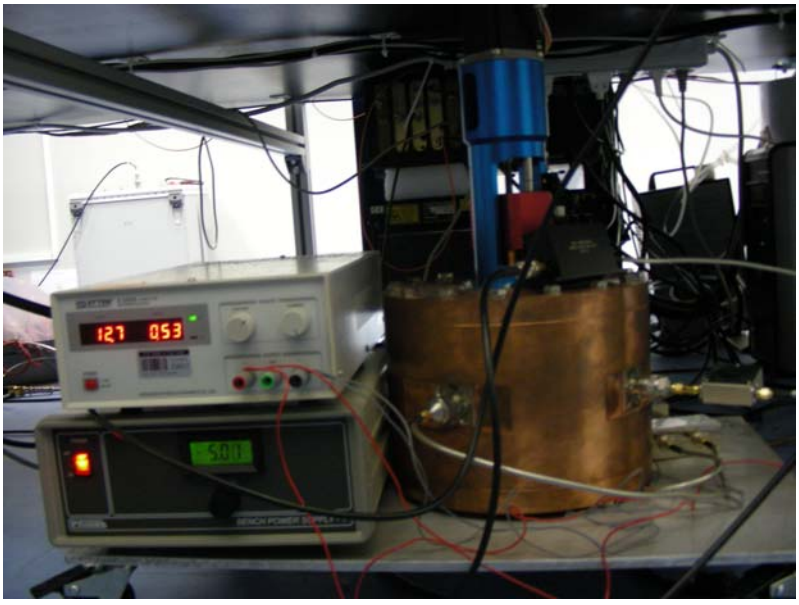


Figure JRA2.3.6: Resonant cavity designed for phase noise measurement.

The time jitter measurement developed and implemented at SPARC, is based on a HV photodiode generating a 100 ps electric pulse synchronous with the UV laser which excites free oscillations of a resonant cavity tuned exactly at the frequency of the reference. The time of arrival is encoded in the phase of the free oscillations respect to the reference, and is recovered by mixing the cavity signal with the reference sine wave. The laser time of arrival is measured and acquired every shot, and the information is available in the SPARC computer control system for statistical analysis and slow feedback implementation. The error signal is used to drive a RF shifter in order change the phase of the accelerating field. In the Figure JRA2.3.7 it is reported the relative laser-to-RF phase measured for each pulse with the phase feedback on. The measurement has been recorded over several hours of the photoinjector operation. The resulted jitter recorded has a standard deviation of 0.65 ps, within the required performance for SPARC.

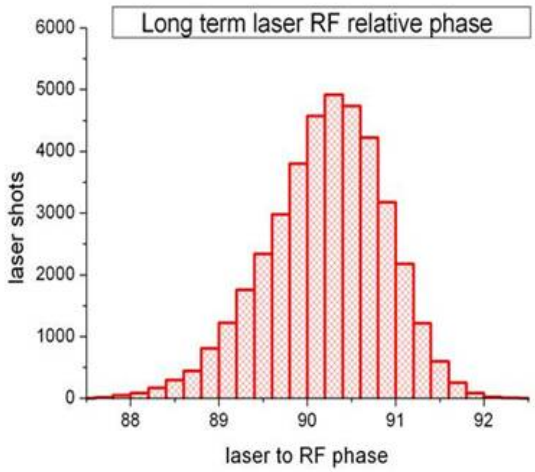


Figure JRA2.3.7: Shot to shot phase noise measurement with the feedback on.

The limitation for better synchronization derives mainly from the bandwidth of the laser oscillator synchronization unit. In fact the PLL used has a small bandwidth (< 5kHz) and does not permit to track fast components of the time jitter.

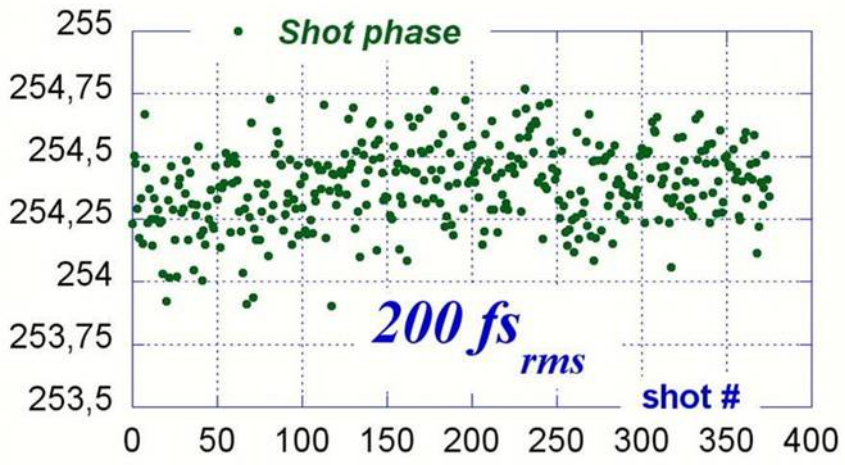


Figure JRA2.3.8: Shot to shot measurement of the relative phase between laser and RF when laser driven configuration is adopted.

A possible way to increase the synchronization level of the photoinjector is to eliminate the RF master oscillator and use the signal coming from the laser oscillator as the machine

reference. This laser driven configuration has been implemented and tested. A stand-alone 79.33 MHz RF reference has been provided to the laser oscillator to ensure long term stability of the optical cavity. A portion of the IR radiation produced by the optical oscillator is converted in a sequence of narrow electric pulses by a fast, high rep-rate photodiode. At the photodetector exit the 36th harmonic of the signal (at the 2856 MHz) is extracted by bandpass filter and used as the reference to drive the entire RF distribution network.
A measurement of the time of arrival stability for laser driven synchronization is reported in the Figure JRA2.3.8. The experimental point shows a reduction of more than a factor 2 with respect to previous measurements. We believe that most of the measured residual jitter (about 200 fs) can be attributed to the electronics and the diagnostic used. We estimate a global synchronization at level of 100 fs is attainable.

Conclusion
The laser longitudinal distribution pulse shaping has been successfully completed. The improvement on electron beam emittance using the square distribution, instead of Gaussian distribution, has been also demonstrated. INFN Frascati and Milano groups have been compared on SPARC photoinjector laser two different pulse shaping technique, using Dazzler and Phase mask, as foreseen in the task of WP3 of the PHIN proposal. The synchronization system has been also realized and tested successfully.

STFC-RAL
No work has been carried out at RAL for PHIN in 2008.

CERN

A laser expert from Frascati has been hired as CERN Fellow and started working full-time on the laser system in January 2008. In the first half of the year, hardware issues concerning the drivers (power supplies) of the two main laser amplifiers were identified. A visit by an expert from the manufacturer (Laselec) finally allowed repairing the drivers.
Also in the first half of 2008, a critical analysis of the laser signal from the first amplifier revealed a serious shortcoming. While the average power was close to specification, the micro-pulse structure was very poor and a lot of laser power was “wasted” as noise between the 10 ps long micro-pulses (laser operated at 1.5 GHz). Measurements using a sampling oscilloscope (Hewlett Packard) revealed that the noise contribution became particularly important as the pumping power in the diodes of the first amplifier approached the nominal values. Switching on the second amplifier even worsened the resulting micro-pulse structure. The problem of noise contribution to average power was corroborated by measurements of poor conversion efficiency from infrared to green, then to UV.
A single measurement of micro-pulse structure using the HP sampling oscilloscope typically takes 30 minutes. Fortunately in July 2008 a fast single shot oscilloscope (LeCroy SDA18000) was bought. Using a fast photodiode coupled to this oscilloscope, the problems concerning the micro-pulse structure are now visualized in a few seconds.

In summary:
- the first amplifier has been set up with three passes and is working according to specification
- the second amplifier has been set up with two passes, leading to an improved laser power while preserving the micro-pulse structure
- the conversion from IR to green, and from green to UV, results in pulse-train power and micro-pulse energy in the UV higher than 50% of the PHIN specification

- the macro-pulse to pulse stability, measured in the laser laboratory, is better than 5% (r.m.s.)
- a clear path towards further improvements, in particular using a third pass in the second amplifier, exists. It will be implemented in April 2009.
- mirrors and wedges to send the laser beam to the PHIN photocathode in CTF2, and to monitor the laser beam profile and energy with a camera and a photodiode, have been installed
- the laser system has permitted to produce the first electron beam in November.

Further to the improvements of the laser system towards routine operation of PHIN, an interlock system to protect the laser from equipment failure, the photocathode from damage due to RF voltage in periods without UV laser light, and to protect the photocathode against unnecessary laser illumination without RF voltage, has been installed.
Finally the synchronization of the laser oscillator with the CTF3 radiofrequency system (1.5 GHz) was established during summer 2008 and has been found to be stable ever since. The measurements using the new, fast oscilloscope confirm a laser-RF timing jitter of better than 650 fs, as specified in the tendering documents for the laser system.

JRA2.4 Work Package 4: RF GUN and Beam Dynamics

JRA2.4.1 Description of the work

FZD

In March 2008 the cathode transfer system was completely mounted (see photograph Figure JRA2.4.1.) and the first Cs_2Te photo cathodes were inserted into the gun. From May until September 2008 the gun was operated with these photo cathodes.

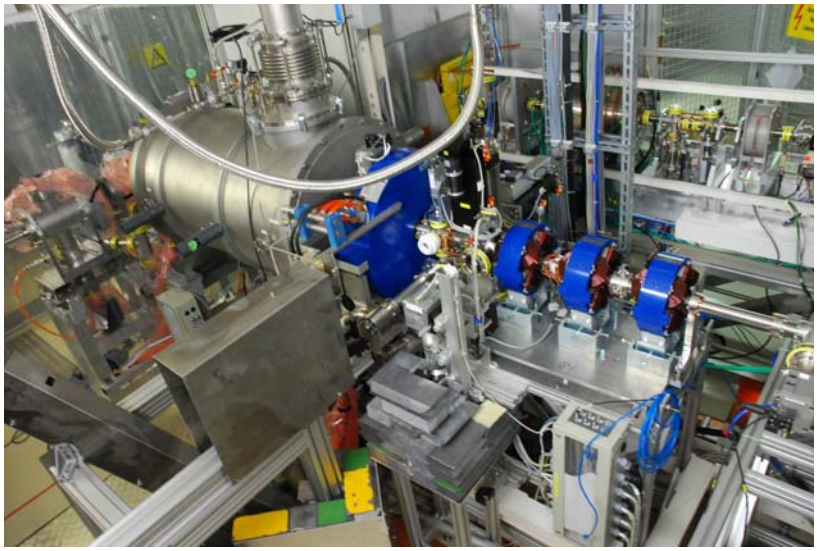


Figure JRA2.4.1: Photograph of the superconducting RF photo gun (SRF gun) in the ELBE accelerator hall.

Since the first beam in November 2007 the gun was operated for about 500 hours without serious problems. The beam time with Cs_2Te photo cathodes was about 400 hours. The gun was operated in parallel to the user operation of the ELBE accelerator. The average current was mostly about 1 µA and always less than 10 µA due to radiation safety restrictions. During the beam time the acceleration gradient was always 5 MeV/m which belongs to 13.5 MV/m peak field in the cavity and about 4.5 MV/m at the photo cathode. The liquid helium consumption due to RF power input was about 5 W.

In the operation period of the SRF gun in 2008, optimization and measurements were carried out concerning the photo cathodes, the driver laser system, the cryogenic system, the RF system and the cavity parameters and the electron beam production and characterization. The work includes the following measurements:
Photo cathodes: Quantum efficiency measurement, QE mapping, cathode lifetime,
Laser: Phase and position stability, laser alignment and reproducibility,
RF measurements: Cooling down curves, Q versus E measurements, pass band frequencies and axial field distribution, Lorentz force detuning, He gas pressure sensitivity, microphonics, higher-order mode excitation, high RF power processing, cavity tuner parameters,
Electron beam characterization: Laser spot and solenoid alignment, laser phase scan, bunch charge and beam current, launch phase optimization, electron beam energy, energy spread, transverse emittance.
Some of the measurements are presented in the following:

RF Measurements
The cavity performance has been measured regularly. Results of the unloaded quality factor Q_0 versus acceleration gradient E_{acc} are shown in Figure JRA2.4.2.. In the figure the second measurement on September 19, 2007 and the eighth measurement on August 28, 2008 are compared. For the second measurement the red curve shows the corresponding radiation level caused by field emission in the cavity. It is obvious that the drop down of Q_0 is connected to the field emission. There is no difference between the two measured Q_0 versus E_{acc} curves, i.e. about 500 h beam time with Cu and Cs_2Te cathode did not cause a degradation of the cavity.

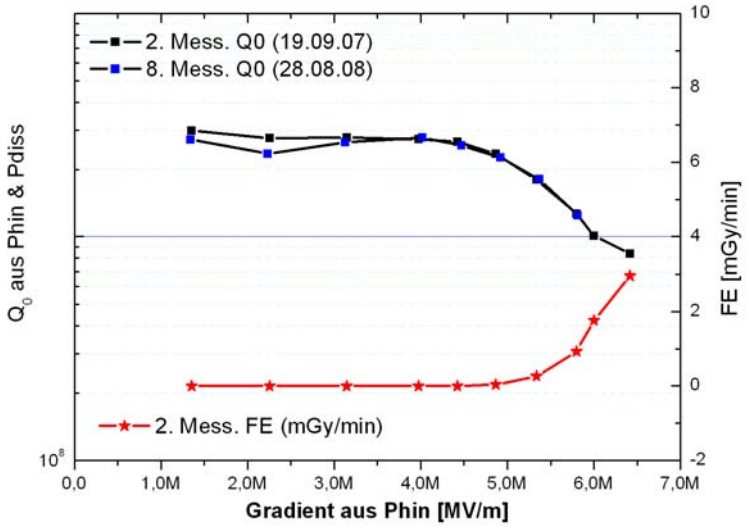


Figure JRA2.4.2: Unloaded quality factor Q_0 versus acceleration gradient and corresponding field emission dose (right side). The figure shows the 2nd measurement in September 2007 and the 8th measurement in August 2008.

Under the consideration of cool-down shrinking, change of permittivity and final BCP cleaning, the field distribution of the operated cavity inside the module can be calculated using the fundamental mode pass band frequencies at 2 K and the last known cavity state before final cleaning. The four pass band mode frequencies measured in the gun at 2 K are shown in Figure JRA2.4.3. In a mathematical model the RF properties of the 3½-cell cavity can be described by an eigenwert problem. The eigen values are the pass band resonance

frequency and the eigen vectors are the field amplitudes in the four cell. Thus the field profile can be calculated from the measured frequencies. The obtained field distribution, shown in Figure JRA2.4.4. is in very good agreement with the design values (64%, 100%, 100%, 100%).

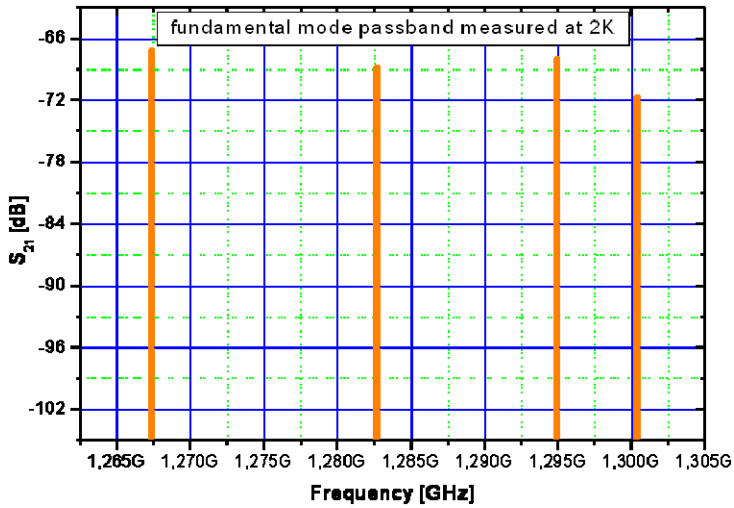


Figure JRA2.4.3: Pass band mode measurement of the 31/2-cell cavity in the gun at 2 K.

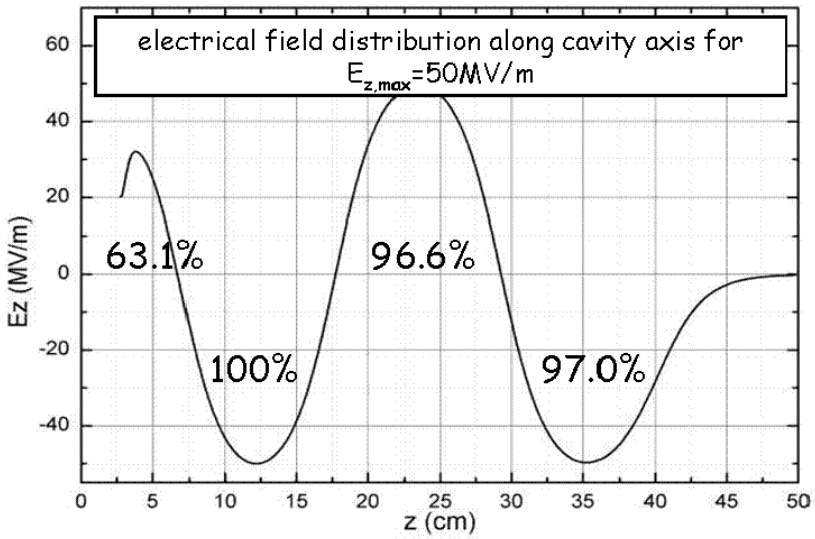


Figure JRA2.4.4: Acceleration field distribution in the cavity at 2 K obtained from the pass band mode measurement. In the figure the distribution $E_z(z)$ is normalized to 50 MV/m peak field.

High power RF processing (HPP) of the SRF gun cavity has been carried out at the end of the first measurement period in September 2008. Due to the risk connected to this treatment it was scheduled to be at the end of the measurement period. It was hoped that this treatment could increase the cavity performance. Indeed, the HPP with pulsed RF up to E_{peak} = 25 MV/m results in a stable CW operation up to 17.6 MV/m peak field (E_{acc} = 6.5 MV/m). Above this level the cavity starts to quench. The improvement is demonstrated in Figure JRA2.4.5. which shows the Q_0 versus E_{peak} curves before (2nd and 8th measurement) and after HPP (9th measurement). The higher gradient will allow operation with particle energy of 3 MeV in the next run.

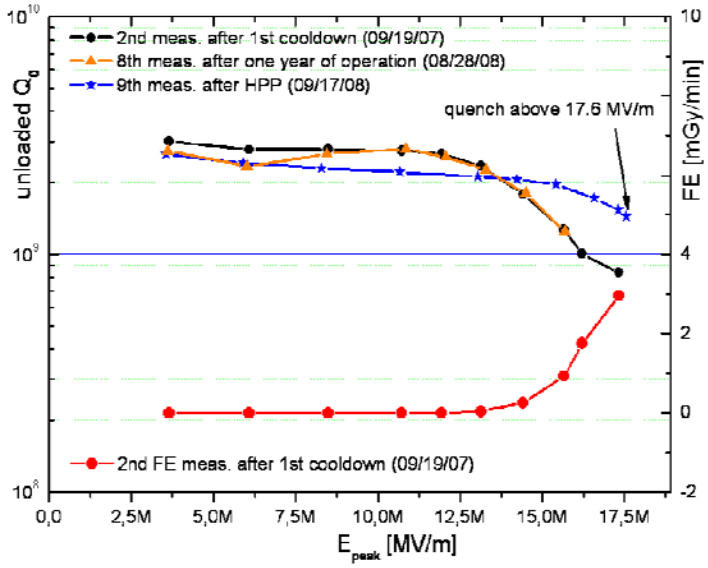


Figure JRA2.4.5: Comparison of the cavity performance, unloaded quality factor Q_0 versus peak field E_{peak}, before and after HPP of the cavity in September 2008.

Electron Beam Parameter Measurements

In Figure JRA2.4.6. a laser phase scan (The laser phase is varied with respect to the RF phase while measuring the accelerated bunch charge after the gun in a Faraday cup at constant laser pulse energy.) is shown for the whole phase range from -180° to 180°. In our definition the accelerating RF field is given by $B_z(z) = B_{z0}(z)\sin\varphi_{RF}$ and the z-axis corresponds to the beam direction. Due to the negative charge, electrons are emitted in the phase range -180° to 0°, whereas emission is suppressed in the phase range 0° - 180°. This behavior is clearly seen in the measured curve. The curve delivers important information on synchronization, phase jitter, and proper operation of the laser system. But the main purpose of the measurement is to determine the optimum laser launch phase for the operation of the gun.

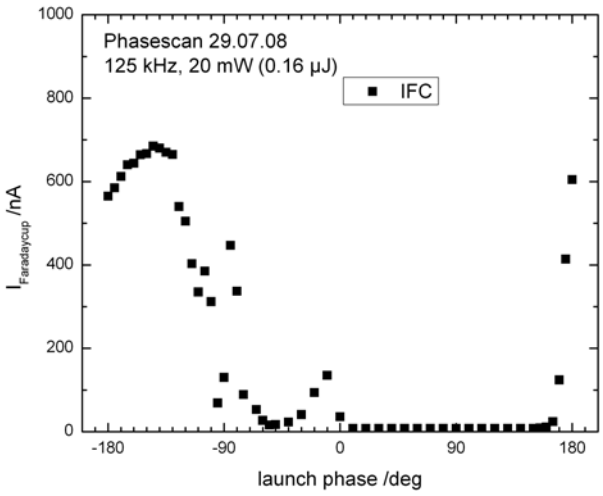


Figure JRA2.4.6: Laser phase scan with low bunch charge measured for a full RF period from -180° to 180° (T = 1/f = 769.2 ps). The dark current measured in the phase range between about 0° and 180° is 8 nA.

The measured bunch charges as function of laser phase for the different repetition rates are summarized in Figure JRA2.4.7. Except the space charge smoothing the behavior is independent of the laser repetition rate. It confirms the proper synchronization of the laser.

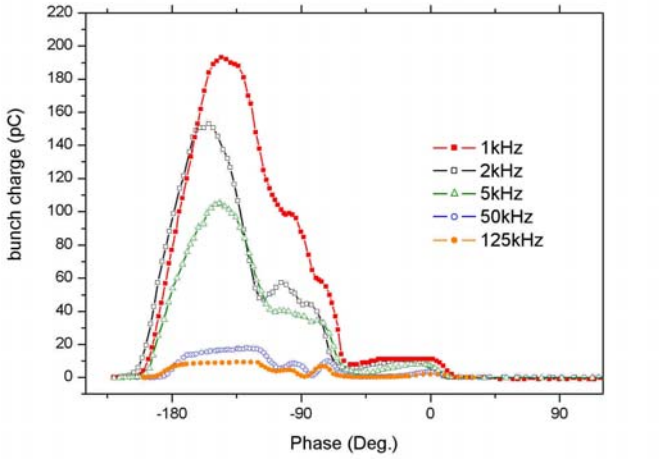


Figure JRA2.4.7: Bunch charge versus launch phase for different laser repetition rates.

For energy and energy width measurement the 180° bending magnet of the diagnostic beam line has been used. The beam energy as a function of launch phase is presented in Figure JRA2.4.8. At the acceleration gradient of 5 MV/m the maximum beam energy is 2.06 MeV.

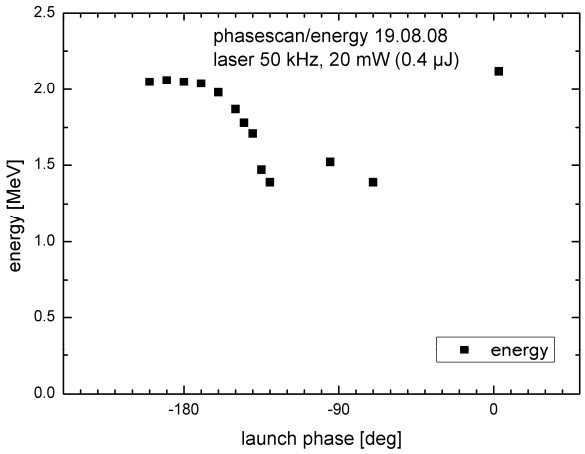


Figure JRA2.4.8: Electron beam energy versus launch phase measured by means of the 180° bending magnet.

The transverse emittance measurements have been carried out with the solenoid scan method. For these measurements the gun solenoid and the screens DV01 and DV02 have been used. Between the solenoid and the screens there is only a drift space of 38 cm and 170 cm, respectively. The quadrupoles in between were not used. The magnetic axial field distribution of the solenoid was precisely measured. Thus the focal strength in dependence on the excitation current I can be calculated. The measured beam size $\sigma^2_{x,y}$ on the screen is a parabolic function in I^2 containing the phase space ellipse parameters. From a quadratic fit these parameters and the emittance can be determined. It is well known that the solenoid/quadrupole scan method is not suitable for space charge dominated beams. Nevertheless, this method has been applied for first preliminary measurements. For the next beam time period in 2009 the slit mask method will be used. In Figure JRA2.4.9. the

evaluation software for the solenoid scan method is shown. In the diagram the square of the rms beam radius is plotted versus the solenoid current. The red curve is the least-square-fit to the measurement points.

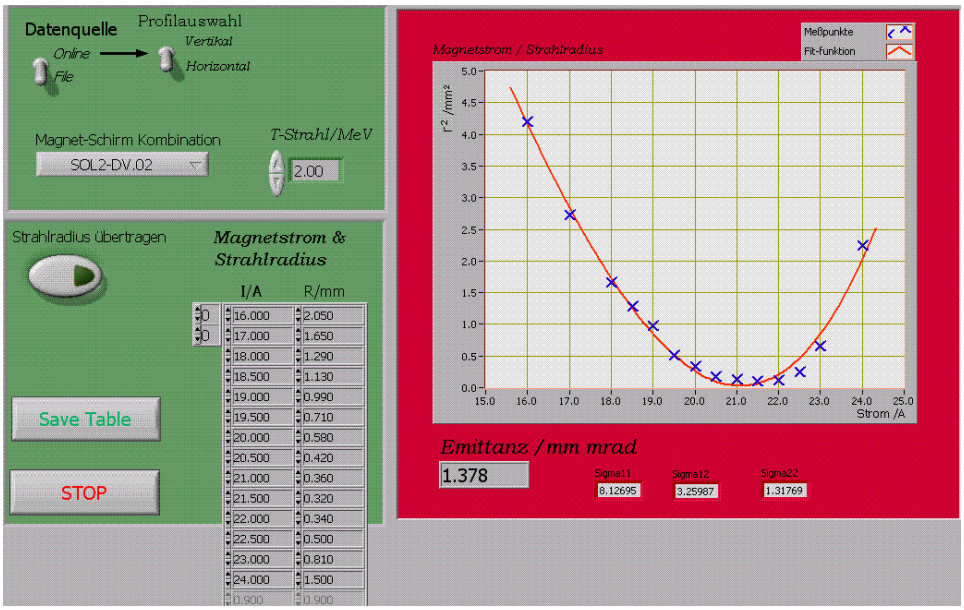


Figure JRA2.4.9: LabView tool for the data analysis of the solenoid scan.

Considering also the results of the laser phase dependence in the energy and energy width measurements, the laser phase was set to -160°. For this laser phase the transverse emittance as a function of bunch charge has been measured. The results are shown in Figure JRA2.4.9. The data analysis has been carried out for the second screen only. It requires less focusing and thus a lower space charge effect is expected. Measurements were carried out till 70 pC. For higher bunch charges the method could not be applied. The strong space charge effect causes a solenoid current dependence of the beam size which could not be fitted with the theoretical curve. Furthermore the beam shows an increasing halo.

In Figure JRA2.4.10 the blue curve shows the result of an ASTRA simulation with parameters which correspond to the present experimental situation. The peak value of the electric acceleration field was chosen to 15 MV/m, the cathode 2 mm retraced, the laser pulse was Gaussian with15 ps FWHM, the laser spot a radial flat top with 2.8 mm diameter, for the launch phase the optimum value was taken for each bunch charge. In the simulation bunches could be accelerated up to a bunch charge of about 100 pC. For higher bunch charges particle loss occurs due the space charge near the cathode. The transverse emittance starts with about 0.5 mm mrad and increases to about 7 mm mrad at 100 pC. This simulation agrees rather well with the experimental data. Especially there is a good agreement in the predicted space charge limit.

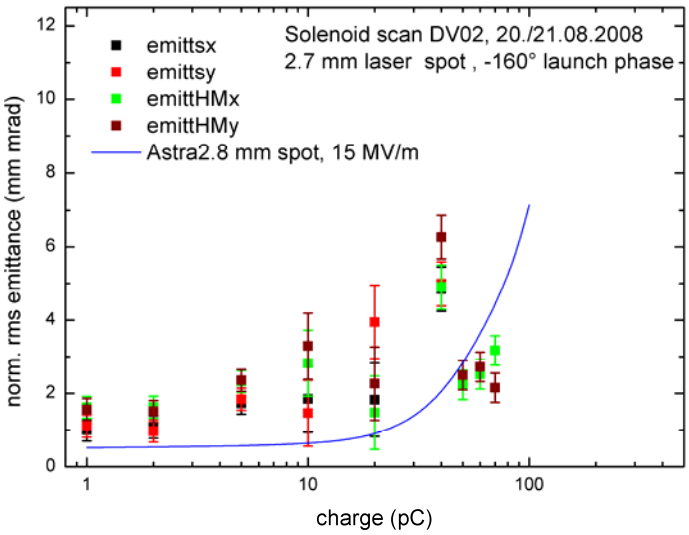


Figure JRA2.4.10: Normalized rms transverse emittance as a function of bunch charge at a laser launch phase of -160° measured with the solenoid scan method using beam spot on screen DV02. Measurement in horizontal (x) and vertical (y) direction, direct rms beam spot size (emittHM) and Gaussian fit (emits).

LOA

No work has been carried out at LOA for PHIN in 2008.

CERN

Two successful attempts were made to repair leaks found after initial brazing. After this, a smaller leak from the water cooling circuit towards vacuum (inner cavity volume) was detected. Unfortunately, due to the gun geometry, the location of this leak could not be identified. Therefore in March 2008, it was decided not repairing the RF gun.

A second, identical RF gun had been constructed at LAL for the photoinjector project (NEPAL) in Orsay. This gun had been brazed in the newly refurbished brazing workshop at LAL. The gun did not show any leaks. Following discussions among the PHIN partners, LAL kindly agreed to give this second RF gun to CERN for the use in PHIN. In order to compensate this arrangement, CERN is contributing financially to the construction of a third gun, for NEPAL.

The RF gun and auxiliary equipment arrived at CERN end of May 2008. It was assembled on its support and installed together with its focusing solenoids during the summer. Five ion pumps, supplied by LAL, were installed around the gun. A considerable effort was needed to align the RF gun on its girder with the existing photocathode manipulator (recuperated from the CTF2 drive beam photoinjector).

The gun was first tested in air at room temperature, and the RF measurements confirmed the resonance frequency found earlier at LAL. After installation of the waveguides including a splitter and a water-cooled load, low-level RF measurements confirmed that the phase advance between the two waveguide branches is correct. The nominal resonance frequency of 2.99855 GHz is reached by adjusting the cooling water circulating through the copper cavity of the gun to a temperature of 34^{o} C.

The PHIN gun is of a novel design since a pumping chamber has been added around the accelerating cells with the aim of improving dynamic vacuum conditions. The pumping chamber is NEG coated. A rest-gas analyzer was provided and installed by the CERN vacuum

group in order to monitor impurities in the gun vacuum before and after RF conditioning, and to measure improvements due to the NEG. The PHIN gun, photocathode manipulator and measurement line have been baked-out in early October 2008. Activation of the NEG coating was avoided by keeping the temperatures low. The idea was to produce a first series of electron beam without using the NEG.
The vacuum in the RF gun is found to be 1.5×10^{-11} mbar after bake-out, and the rest-gas analysis does not show any unwanted impurities. The complete waveguide is installed as shown on Figure JRA2.4.11. Interlocks from vacuum and cooling water systems have been tested, and the first RF conditioning was performed in October. The required RF power (without beam) of 13 MW has been achieved under stable conditions on November 5th. The first electron beam in PHIN has been produced on November 6th.

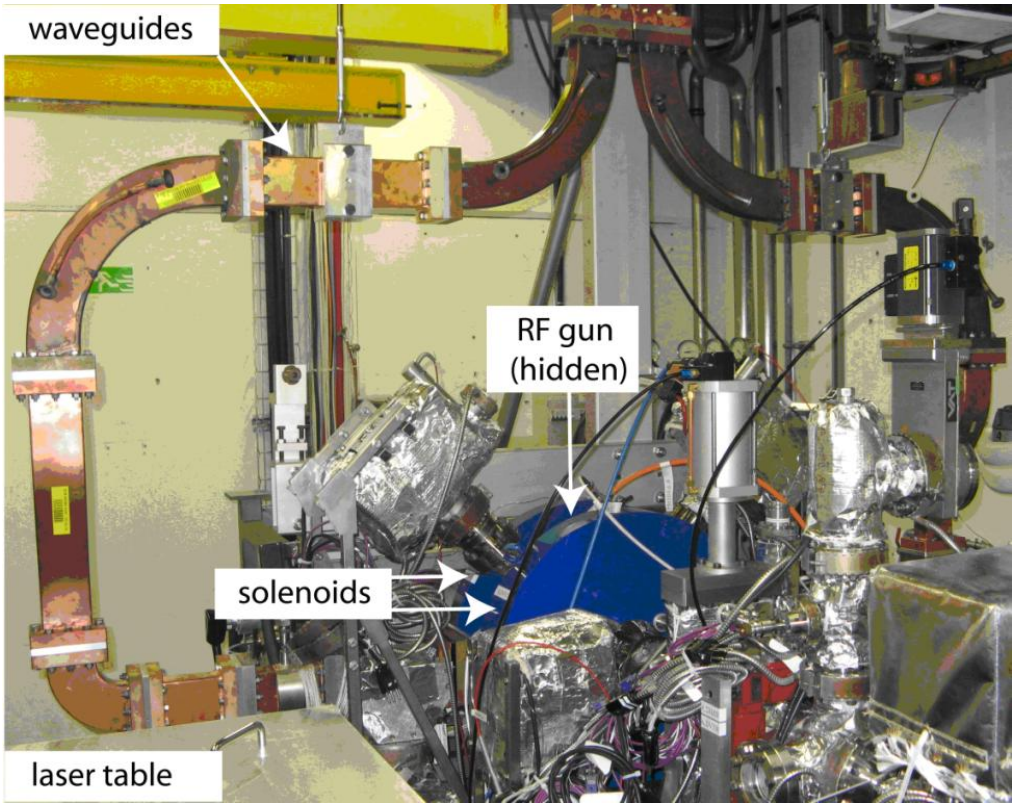


Figure JRA2.4.11: The completed PHIN installation in the CTF2 building at CERN.

LAL

1) The RF gun for CERN

Cavities of the gun were mechanically adjusted at LAL and sent to CERN to be brazed. Unfortunately, big leaks were discovered in January 2008 and in March 2008, the RF gun was sent to LAL to undergo a thorough investigation by the vacuum group at LAL. Finally it was decided that the leak was so huge that the gun was not usable. An agreement was found between LAL and CERN (see CERN paragraph above). The second PHIN gun has been installed with the help of LAL's staff expert in mechanics in the CTF2 test area. After RF conditioning, the nominal accelerating gradient of 85 MV/m was obtained and all the parameters were in agreement with the specifications.

2) The NEPAL test beamline at LAL

The fabrication of a third PHIN gun has begun at the LAL workshop. In taking into account all the different stages of the construction, this new gun will be not available before June 2009. Hence, experiments with this gun will be carried out in the second half of 2009.

Waiting for the PHIN gun it was decided to install in the NEPAL station another 3 GHz RF gun built by LAL called AlphaX RF gun (see Figure JRA2.4.12.). So an electron beam would be produced in the NEPAL station in the beginning of 2009. The AlphaX gun is also a 3 GHz 2.5 cells, the main difference with respect to the PHIN gun consists in a coaxial coupling of the gun with the waveguide instead of hole coupling.

Figure JRA2.4.12: AlphaX RF gun.

As for the PHIN gun, the AlphaX gun was designed to be able to sustain high gradient and to reach very low emittance. It was installed in the beamline in June 2008, a picture showing the connection to the waveguide is given in Figure JRA2.4.13.

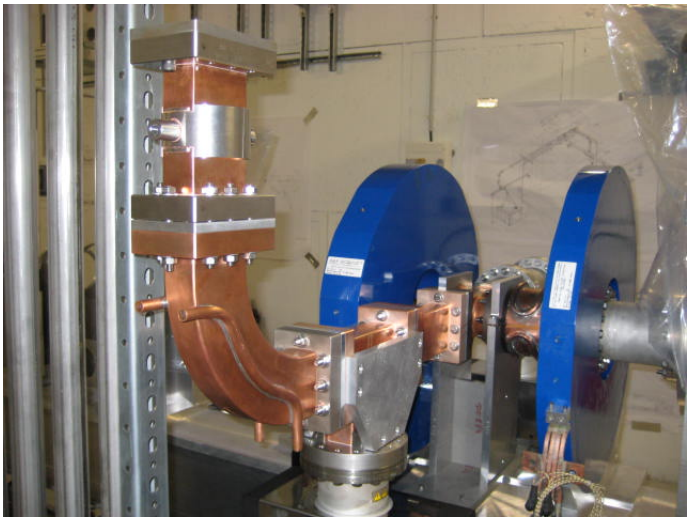


Figure JRA2.4.13: RF gun AlphaX installed in the NEPAL beamline.

The major part of the beamline was completed in June 2008. Figure JRA2.4.14. shows the NEPAL station as it is today.

Figure JRA2.4.14: Beamline in the NEPAL station.

All the components are installed in the beamline: the AlphaX RF gun with 2 solenoids coils to compensate the emittance growth induced by the space charge forces, vacuum chambers with the required pumping capacity and jauges, steerers, Wall Current Monitors (WCM), dipole to analyse the beam energy and Faraday cup at the end of the beamline. The laser is installed in a hutch nearby and the UV optical beam is transported in the air with mirrors close to the beamline. The laser is available for 2 years and routinely produces roughly 100 µJ at 262 nm which are enough to get more than 1 nC electron bunch with Cs_2Te photocathodes. However the construction of the photo-cathode preparation chamber was stopped due to errors in the technical drawings. So the RF gun will use copper photo-cathodes, therefore the maximum charge will be 100 pC.

Outside the shielding there is on one side the control room and on the other side all the power supplies, racks with electronics to control the accelerator and the modulator coupled to the klystron. Commissioning of the modulator began at the end of August 2008 and good results were quickly obtained (see Figure JRA2.4.15).

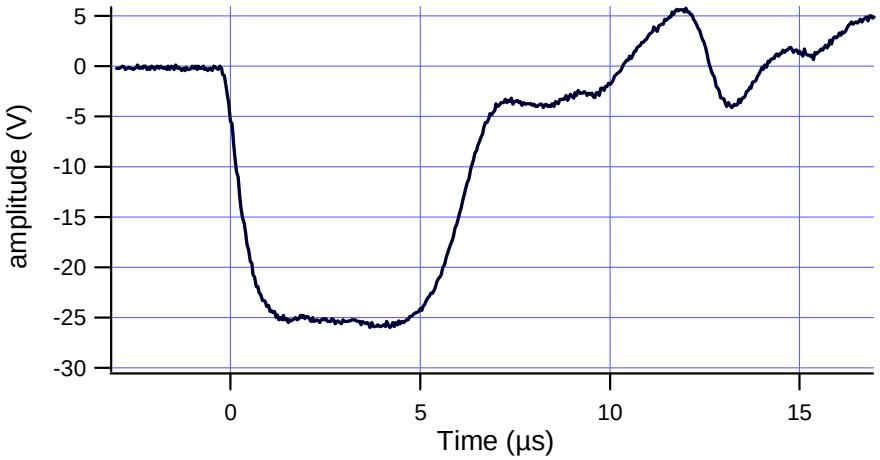


Figure JRA2.4.15: A typical measurement of the high voltage (after a divider) pulse produced by the modulator for -8 kV of the high voltage power supply.

The modulator shows a plateau with a duration about 3 µs with a flatness better than 1 %, rms. Yet, there is also an overshoot (the voltage becomes positive instead of going to zero) too high to operate the klystron at the maximal power, e.g. 20 MW. Nevertheless for the AlphaX gun we only need 5 MW. So we will perform the start-up of the accelerator before to repair the modulator.

Recently, several technical difficulties occurred which prevented to produce HF power and to begin the conditioning of the alphaX gun. Among them: in the regulated water cooling system, the pump went out of order; in the normal cooling water system there was a leak; one key is missing in the radiation safety board; pneumatic valves in the beamline went out of order. Solutions are being brought to all these problems but it takes time, mainly when new orders are necessary. So, it is difficult to foresee with precision the date of the start-up but it should be during the first half of 2009.

JRA2.5 Significant Achievements

1) CTF3:

The PHIN photo-injector foreseen for the CTF3 Drive Beam has been completed on a dedicated stand-alone test bench. The photo-injector operates with a 2.5 cell RF gun working at 3 GHz. A 30 MW modulator-klystron has provided the necessary power to the RF gun and an accelerating field of 85 MV/m was obtained. A UV laser beam at 262 nm has been sent to the Cs_2Te photocathode. The Nd:YLF laser system consists of an oscillator, a preamplifier operating at 1.5 GHz and two powerful amplifier stages. The infrared radiation (1047 nm) produced at the source had its frequency quadrupled in two stages to obtain the UV light (262 nm). The synchronization between the RF and the laser was better than 1 s□ps. The train length was 1.3 composed of 1908 bunches in the train.

2) NEPAL:

The present RF gun is called AlphaX gun and is temporarily installed waiting for the third PHIN gun which is under construction. The laser routinely produced 100 μJ at 262 nm which are enough to get more than 1 nC electron bunch with Cs_2Te photocathode. The commissioning of the new modulator has started. The complete NEPAL beamline was completed in June 2008.

3) ELBE:

The first accelerated beam was produced in November 2007 using a copper photo cathode. In 2008, the cathode transfer system was completed and the SRF gun was operated with Cs_2Te photo cathodes. The gun was operated in parallel to the user operation of the ELBE accelerator. The average current was mostly about 1 μA. During the beam time the acceleration gradient was always 5 MeV/m which belongs to 13.5 MV/m peak field in the cavity and about 4.5 MV/m at the photo cathode. In the operation period of the SRF gun in 2008, optimization and measurements were carried out concerning the photo cathodes, the driver laser system, the cryogenic system, the RF system and the cavity parameters and the electron beam production and characterization.

4) SPARC:

In the SPARC photoinjector the emittance evolution of the electron beam has been measured with Gaussian and square laser pulse longitudinal distribution. The comparison of the results, with the same photoinjector parameters, shows that the square pulse improves the beam emittance and the project value, 1.5 mm mrad, has been achieved. The two laser pulse-shaping system, the DAZZLER and liquid crystal mask, proposed in PHIN JRA have been tested with very good results.

1.4.3 JRA3: High Intensity Proton Pulsed Injector (HIPPI)

The list of participants and their implication in the HIPPI Work Packages (**C**: Coordination, X: Participation) is given in the table below. The overall management is done by CERN.

Number	Participant	WP1 M&C	WP2 NC	WP3 SC	WP4 CHOP	WP5 BD	Person-months
1	**CEA**	X	X	**C**	X	X	57,76
3	**CNRS**	X	**C**	X	X	X	20,7
	CNRS-IPNO			X			
	CNRS-LPSC	X	**C**	X	X	X	
4	**GSI**	X				**C**	38,3
5	**IAP-FU**		X	X		X	25 (13)
7	**FZJ**			X		X	19,39
10	**INFN**			X		X	7(1)
	INFN-Mi			X		X	
17	**CERN**	**C**	X		**C**	X	89(14)
20	**STFC**		X		X	X	**38,2**
	STFC-RAL		X		X	X	

1 MANAGEMENT ACTIVITY

In 2008 the main management efforts went into assuring a correct termination of the Activity in the due time. This required following the production of the remaining deliverables and adapting the scope of some deliverables that were subjected to external delays, in order to fulfil the scientific content while remaining in the time frame foreseen for the Activity. Moreover, the preparation of the final common deliverables, in the form of comparative assessment of technologies signed by all the participating members, required a particular care and the definition of an appropriate framework.

The main organisational problems concerned the delay in the construction of the "IPHI RFQ", a 3 MeV proton accelerator being built by CEA and IN2P3 in France. CERN had an agreement with these two institutions for the delivery to CERN of this RFQ, which would be used to test with beam the chopper line being built inside HIPPI. Unfortunately technical problems have delayed the construction of this RFQ, which at end 2008 is still far from being completed. After long discussion and negotiations, it was considered that there were no alternatives for a beam test to the IPHI and RFQ, and the HIPPI management, in agreement with the CARE management, has decided by "force majeure" to reduce the deliverable on the chopper line tests to a complete test of all equipments in the line, but without a particle beam. Another discussion concerned the high-power tests of superconducting cavities at CEA Saclay. The cavity production is late by about 6 months, and testing of this cavity is in the CEA priorities even without the HIPPI support. In order not to delay the end of the CARE project, it has been decided that the deliverable on high-power cavity test will concern only the test of the cavity coupler, one of the most critical components.

Respecting the deadlines for the deliverables due in 2008 required a constant follow-up and contact with the participating Laboratories.

The preparation of the comparative assessment, the final deliverables for each of the Workpackages, required a particular care. It was decided to identify in each Workpackage a responsible for this deliverable, with the duty of collecting information from the participating teams and of writing the draft report for the deliverable, to be circulated and correct by the other partners. As responsible for the comparative assessment we have tried to choose young scientists, if possible from small laboratories. The goal was to find people more open to new ideas and less biased towards one or the other solution than the older experts. At the same time, young persons have more time to devote to the preparation of these assessments, and for them the preparation of these reports would constitute an excellent training.

The preparation of the Annual Meeting, which took place at CERN from October 29th to 31st required more attention than the previous years. Being the last in the series, it was important to give an overview of all the achievements of the Activity, and not only of the last year, and it was important to have from the External Scientific Advisory Committee a more general report on the impact of the Activity.

Main achievements:

WP2: successful testing of the DTL prototype at CERN, which has allowed validating the construction technology and the novel drift tube alignment system.

Completion of the design of the PIMS accelerating structure, solving the remaining design issues and launching the construction of a full-scale prototype.

Completion of the measurements on the CH model and of the design of the full-scale prototype.

WP3: Completion and vertical tests of Cavity B at CEA Saclay

Completion of the spoke prototype at FZJ, treatments at CNRS Orsay and successful measurement.

WP4: Assembly of the chopper line at CERN

WP5: Benchmarking experiments completed at GSI, with improvements to the UNILAC machine.

JRA3.1 Work Package 1: Management and Communication

The main Management activities in 2008 have been:

- the follow-up of implementing the recommendations from the ESAC reviewers,
- the preparation of the Work Package meetings and of the HIPPI Annual meeting,
- the preparation of the HIPPI Annual Meeting, both for the logistics (the meeting took place at CERN) and for the scientific preparation (scientific programme, recommendations from the ESAC reviewers).
- the follow-up of the HIPPI milestones and deliverables: contacting the responsible persons for the different deliverables, keep track of the delays, and when the deliverable is achieved be sure that the proper supporting document is prepared and submitted required a constant care from the Coordinators.

The follow-up of ESAC recommendations lead to an important result for the PIMS accelerating structure (WP2). At the HIPPI Meeting of September 2007, the ESAC expressed some concerns for the field stability in the 5-cell PIMS in presence of loading from the particle beam, and for its influence on longitudinal beam dynamics. After the meeting and following the suggestion of the Coordinator, work was oriented in this direction coming to a set of satisfactory calculations that were presented already at a meeting in January and generally accepted as solving the issue.

For the Deliverables, apart from the still important work of following up the correct preparation and filing up of the deliverables, more effort went into the preparation of the final common assessments (on Normal Conducting structures, Superconducting structures and on choppers) that are the most important outcomes of the HIPPI work. For these very peculiar deliverables, it was decided that the compilation of the common assessments should be given to young researchers within the HIPPI team, persons with more time available and less pre-opinions than the team leaders. These assessments will be an excellent way for them to become familiar with all the possible structures foreseen for linacs and their features.

As for the timing and scope of the deliverables, the main decisions taken after consultation with the HIPPI partners and with the CARE Management were:

1. The deliverable on beam measurements with the chopper line at CERN was replaced with the assembly and testing of all chopper line components, in the real environment but without beam. This is the consequence of the delay for technical reasons by more than 2 years of the delivery of the RFQ accelerator. This RFQ is outside of HIPPI, and is required to provide the beam for the tests. Several alternative options have been considered (moving the chopper to another laboratory, testing with electrons, etc.) but for all these options the scientific results were considered minor with regard to the large resources to be invested.

2. The deliverable on cavity testing at the high-power test stand at CEA Saclay has been replaced with coupler testing at the same test stand. The test stand is now completed, but because of delays in the preparation of the cavity the high-power tests can take place only at the end of 2009. Instead of delaying the end of the CARE programme waiting for this test, it has been decided to accept as deliverable the test of the cavity

coupler, which will demonstrate the efficiency of the test stand and that can take place in February 2009. The CEA has engaged to complete the test of the cavity in 2009 after the end of HIPPI.

3. The deliverable on CH tuner tests will be provided only in February 2009. The cavity is ready, vertical tests have been made and only minor work is required for the most significant horizontal test.

It is therefore foreseen that all HIPPI activities will be completed in February 2009.

JRA3.1.2 External Scientific Advisory Committee

JRA3.1.2.1. Composition

The ESAC has the following members, since the beginning of the HIPPI Activity:

- Andrea Pisent INFN Legnaro (Italy)
- James E. Stovall now retired; previously SNS and LANL (USA)
- Yoshiharu Yamazaki J-PARC Tokai (Japan)

JRA3.1.2.2. Report of the ESAC

A web site with all the slides of the presentations at HIPPI07 was made available to the members of the ESAC committee one week before the meeting.

Preliminary recommendations from the ESAC were presented during the last session of HIPPI08 and the final ESAC report was delivered on 28 November 2007, in time for the CARE Meeting at CERN at beginning of December. The report was discussed at the HIPPI Steering Committee Meeting during CARE08.

The task to the ESAC for the last meeting of the HIPPI series was partly different from previous years. In particular, it was asked to underline the accomplishments and to comment on the scientific quality of the work and on the effectiveness of the interaction for the entire duration of the project.

JRA3.1.4 List of papers

In 2008, HIPPI has produced 16 conference papers, 1 journal publication, 4 notes, 2 Quarterly Reports and 9 CARE Reports in support of corresponding deliverables.
HIPPI papers are available on the CARE Web Site, except HIPPI Documents that are available on the HIPPI Web site.

JRA3.1.5 Web site

The HIPPI web site (**http://mgt-hippi.web.cern.ch/mgt-hippi/**) is the site where all the HIPPI news is published. It contains link to the working package pages, to the annual HIPPI meetings and presentations, to the job openings and the list of publications. It is maintained by CERN staff.
Work Package coordinators and the Laboratory link-persons contribute to keep the information up to date.

STATUS OF THE WORK

The basic HIPPI work is completed, with few remaining tasks continuing in the first two months of 2009. Completion of the work with the preparation of the last deliverable reports is expected for end of February 2009

JRA3.2 Work Package 2: Normal Conducting Accelerating Structures

JRA3.2.1 Drift Tube Linac (DTL)

JRA3.2.1.1 Activities at Rutherford Laboratory (RAL) (WBS 2.1.4)

At Rutherford Appleton Laboratory, activities were concentrated mainly on the design of the normal conducting part of a future 800 MeV linac. The proposed linac is being considered as a possible replacement for the aging current 70 MeV ISIS injector (MW upgrade plans), and the same linac has also been included in designs for the proton driver for a possible UK Neutrino Factory.

The first two DTL tanks of the new linac have been modelled using Superfish and Microwave Studio and will accelerate a 40 mA H- beam up to 35 MeV. Beam dynamics studies are being made using Trace3D, Parmila and TraceWin and efforts are put into matching the beam from the three existing FETS front end designs.

In order to optimize the choice of accelerating structures for the new linac, a comprehensive comparison is being performed at RAL and the HIPPI normal conducting structures are being analyzed in collaboration with our HIPPI colleagues. The structures considered in this work are the DTL, S-DTL, CCDTL, SCL, the H-mode DTL and the PI-mode structure. The schemes being analysed are :

a) Front End + DTL @ 324 MHz + CCL @ 648 MHz + ScL @ 648 MHz
b) Front End + DTL @ 324 MHz + ScL @ 648 MHz
c) Front End + DTL @ 324 MHz + CCL @ 972 MHz + ScL @ 972 MHz
d) Front End + DTL @ 324 MHz + ScL @ 972 MHz

The scheme a) layout can be seen in Figure JRA3.2.1.

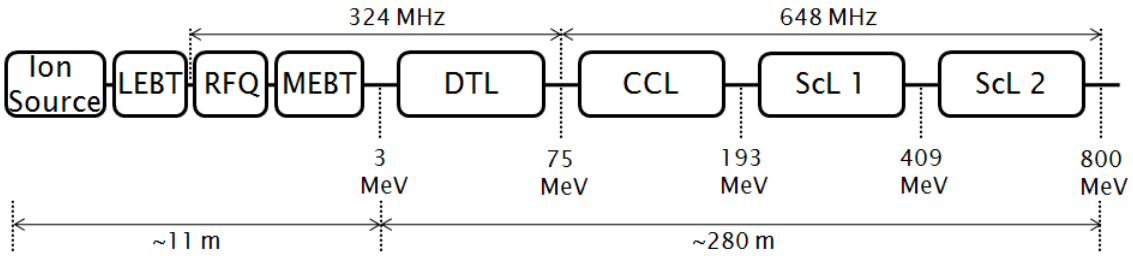


Figure JRA3.2.1.: 800 MeV Linac Layout (scheme a)

JRA3.2.1.2 DTL general design at CERN, LPSC, CEA (WBS 2.1.1 to 2.1.4)

The construction of a new DTL prototype, funded outside HIPPI but based on the HIPPI DTL design and aimed at testing the solutions developed in HIPPI has progressed well in 2008. This prototype development was started in November 2006 as consequence of the recommendations of the HIPPI ESAC committee. The components have been received at CERN in March 2008 (Figure JRA3.2.2). CERN continued with the copper plating of the cavity and the end-caps, and with the welding and assembly of the drift tubes. The DTL was assembled during summer 2008, metrology tests for the alignment were completed in September 2008 and were followed by low-level RF tests (frequency, field on axis), vacuum tests and final low-level RF measurements. High-power RF tests will take place in 2009.

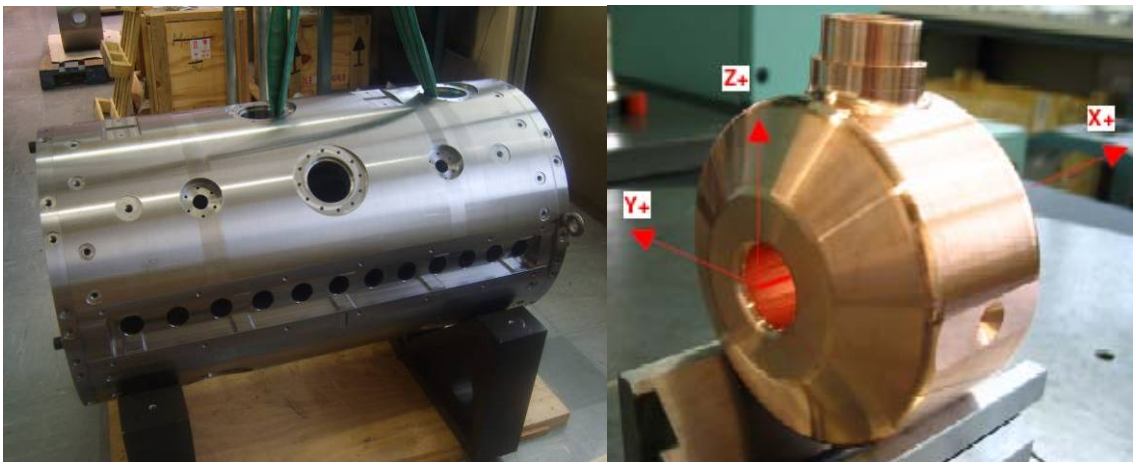


Figure JRA3.2.2.: DTL prototype cavity and drift tube core after machining.

In parallel to the production of the prototype structure, a pre-prototype structure of 320 mm length consisting of a tank segment, a short girder for 2 drift tubes and pieces for two simplified test drift tubes has been machined and assembled (Figure JRA3.2.3). The purpose of this pre-prototype structure is to verify the drift tube E-beam welding procedure, the drift tube to girder assembly procedure, and their compliance with tolerances. As soon as the pre-prototype is completed, it will serve as a test structure for alignment procedures until the prototype structure will be completed.

Figure JRA3.2.3: The CERN DTL pre-prototype structure.

The drift tube tests in the ISTC project 2888 have been completed by end of November 2007. The design is promising and passed practically all non-destructive tests. When destructing the drift tube for weld tests however, it became clear that the laser weld penetration of 0.15 µm-0.2 µm is not sufficient to guarantee long-term leak tightness and sufficient durability in assembly operations. An improvement of the laser welds as prove of technology was requested on an additional drift tube sample.

Concerning the CERN prototype the findings are not as critical as the assembly procedure of the stem to core connection foresees e-beam welding. E-beam welding guarantees a full penetration of the weld area and would be compatible with an assembly procedure executed on CERN manufacturing equipment including the insertion of a permanent magnet quadrupole.

For the assembly of the prototype structure, the welding procedure for the drift tube to stem connection was tested on samples. Based on the results of these tests the 12 prototype drift tubes were assembled and mounted in the prototype DTL cavity (Fig. JRA3.2.4.).

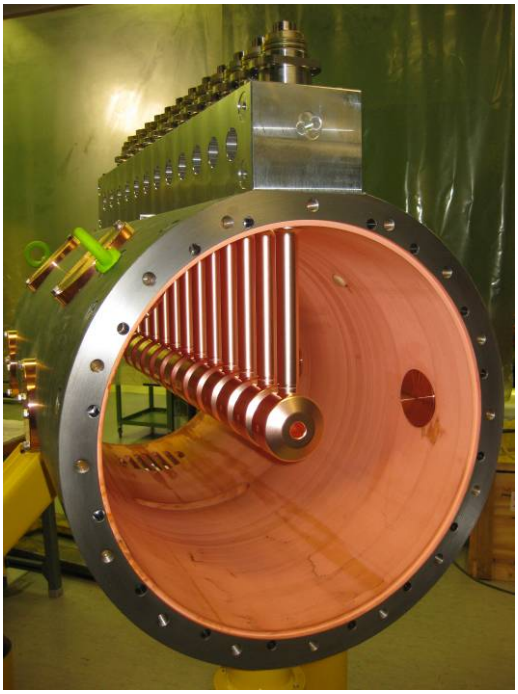


Figure JRA3.2.4: The assembled DTL prototype.

The drift tube positions were measured by laser tracker and all were found to be within tolerances which are ±0.1 mm and ±3 mrad in all three dimensions. The final results are listed in the table below:

	Survey				
	Center calculated				
No point	X (horiz)	Y (long)	Z (vert)	Y (yaw)	Z (roll)
1	0.015	0.000	-0.002	0.000E+00	-1.655E-04
2	-0.035	0.142	0.016	1.407E-03	-1.200E-03
3	0.041	0.063	-0.007	4.244E-04	6.210E-05
4	-0.018	0.029	-0.003	1.283E-03	-4.037E-04
5	0.008	0.001	-0.021	-1.604E-03	-6.621E-04
6	-0.066	0.057	0.003	-8.483E-04	-2.472E-03
7	0.050	0.042	0.016	5.487E-04	-8.283E-05
8	0.042	0.075	0.005	-1.180E-03	1.553E-04
9	-0.056	0.136	-0.025	5.074E-04	-7.145E-04
10	0.026	0.108	0.033	-2.589E-04	1.118E-03
11	-0.007	0.146	-0.008	5.488E-04	-6.006E-04
12	-0.002	0.074	-0.007	-9.841E-04	1.968E-04

AVG	0.000	0.073	0.000	-1.292E-05	-3.975E-04
STDEV	0.038	0.052	0.016	9.717E-04	8.781E-04
MID	-0.008	0.073	0.004	-9.806E-05	-6.770E-04
MAXMIN/2	0.058	0.073	0.029	1.506E-03	1.795E-03
MAXABS	0.066	0.146	0.033	1.604E-03	2.472E-03

Following the good results of the alignment tests, the cavity was closed and tested with RF at low power. The measured Q-value of 34'000 corresponds to 80% of the Q-value given by 2-D simulations. The field profile along the prototype (from a bead-pull measurement) is shown in Figure JRA3.2.5.

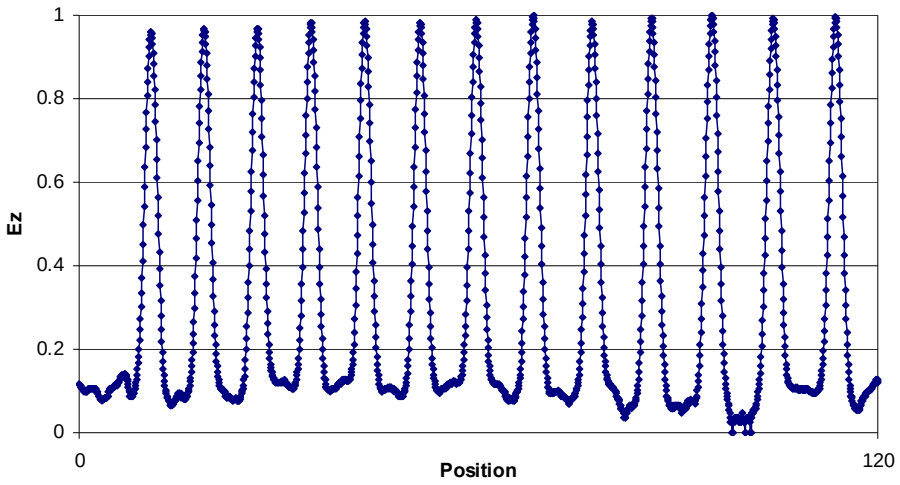


Figure JRA3.2.5: Measured electric field profile along the prototype.

JRA3.2.2: H-mode DTL (IAP Frankfurt)

JRA3.2.2.1 RF cold model construction

The fabrication of the 1:2 scaled model of the second resonator of the GSI P-Injector has been completed and in 2008 the model went through extensive experimental investigation. Preliminary results indicate a good agreement between the simulations and the experimental results in terms of frequency and field distribution.

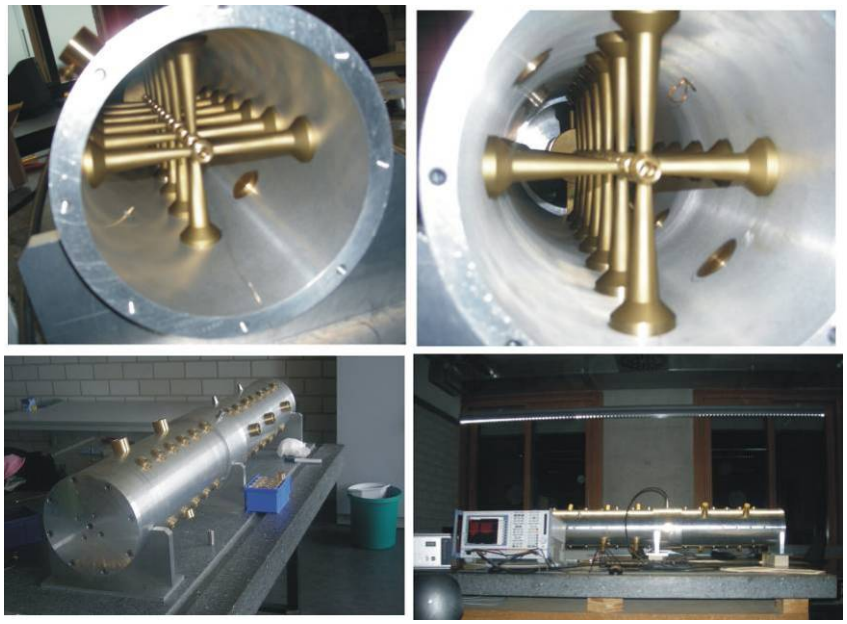


Figure JRA3.2.6: Top: internal view of the scaled model of the second resonator of the FAIR proton injector. Bottom: the cavity of the test bench built at IAP.

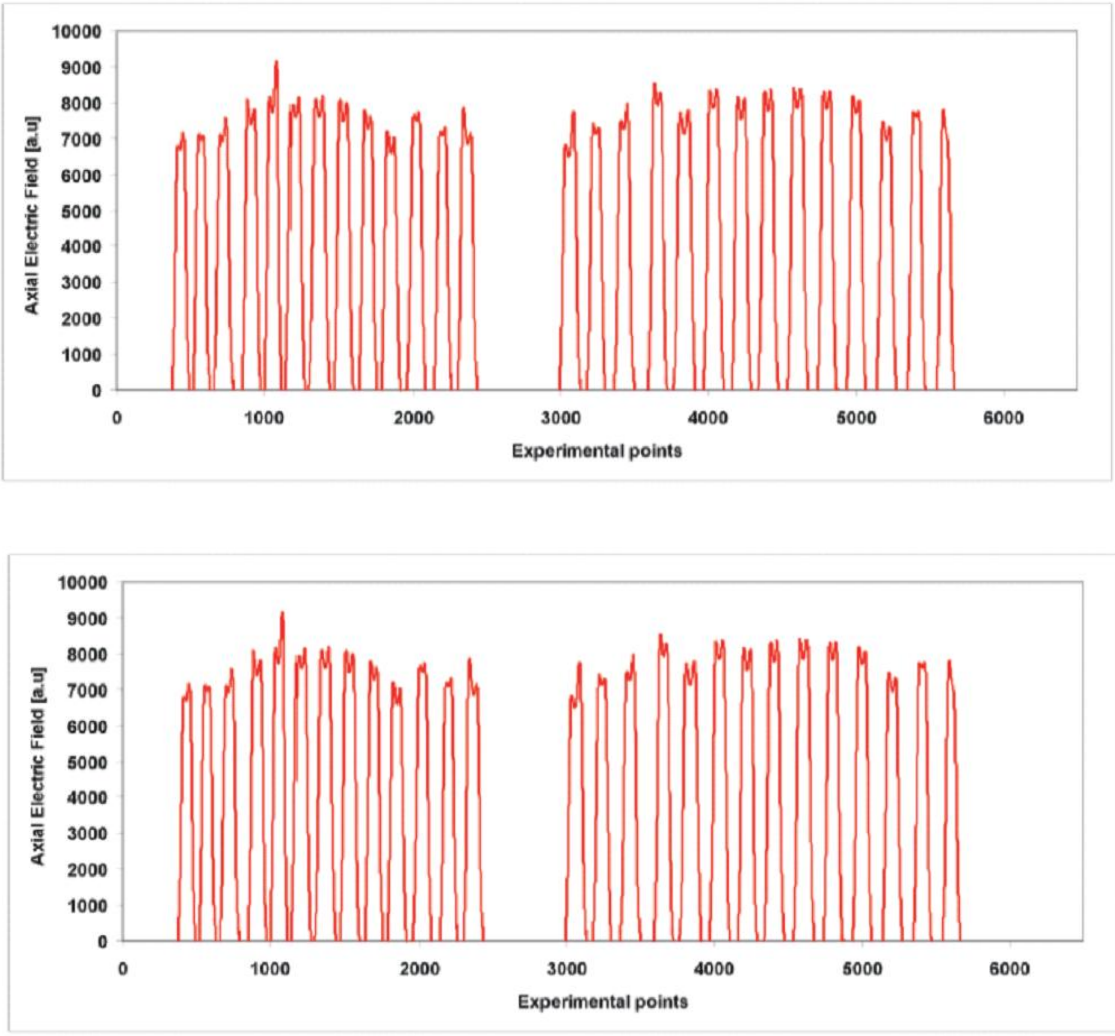


Figure JRA3.2.7: A measurement of field distribution

Following those results the preparation of the technical drawings for the production of the full scale prototype has been started in the second half of the year. An example, indicating the present status of the design, is shown in Fig. JRA3.2.8.

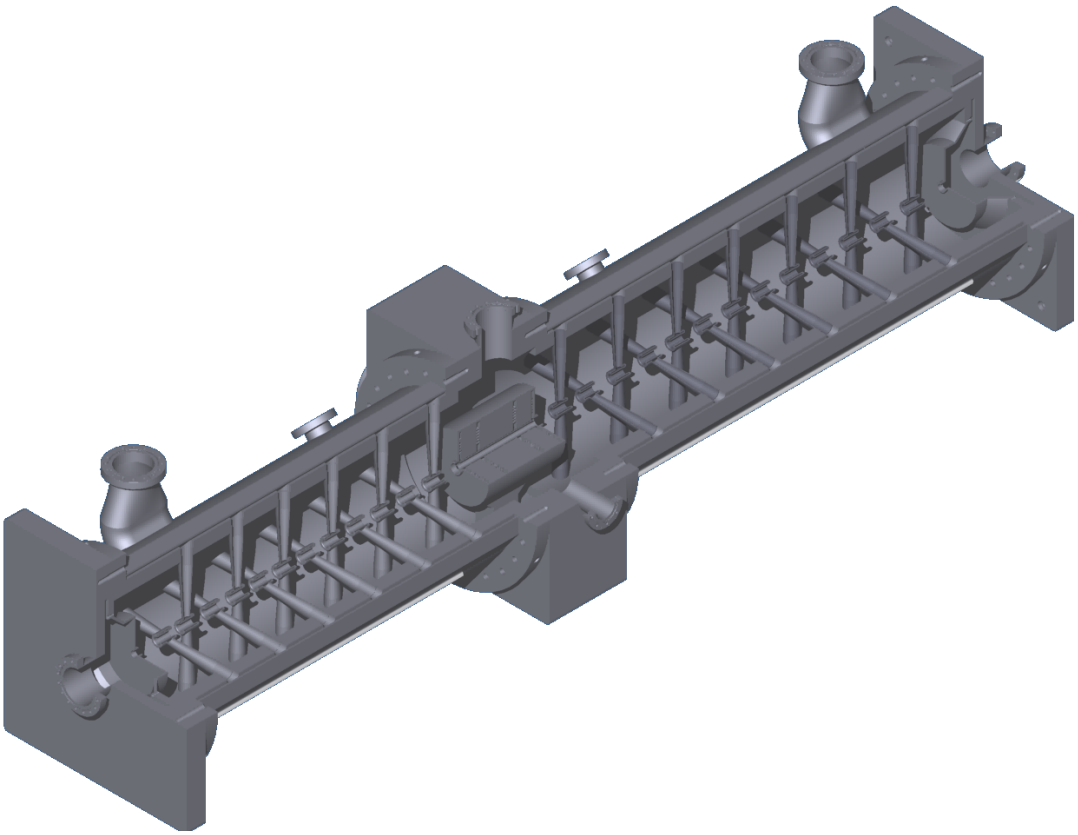


Figure JRA3.2.8: The second resonator of the FAIR proton injector

The attention was focused, in particular, in the definition of the building strategy for the coupling cell and for the intertank section which connects uncoupled resonators. As shown in Fig. JRA3.2.9 and JRA3.2.10 the adopted solution is very similar in both cases: in the quadrupole triplet is located in a parallelepiped box which is flanged to the resonators resulting in a very compact and reliable design.

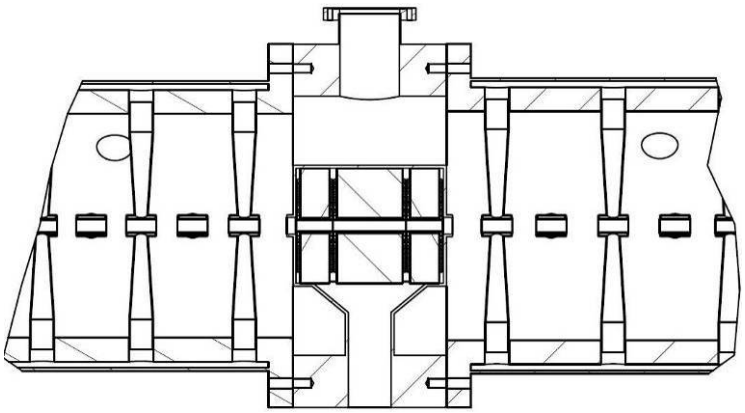


Figure JRA3.2.9: A detail of the coupling cell: the upper flange will be used as RF port

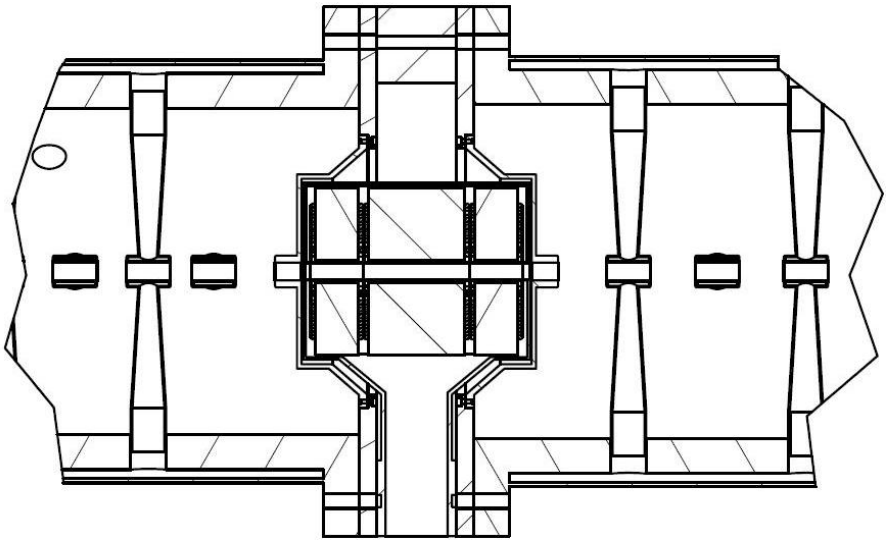


Figure JRA3.2.10: A detail of the intertank section between non coupled resonators

In parallel, a first stem (Fig. JRA3.2.11) has been produced in order to investigate the mechanical stability together with the welding procedure which will be used during the construction.

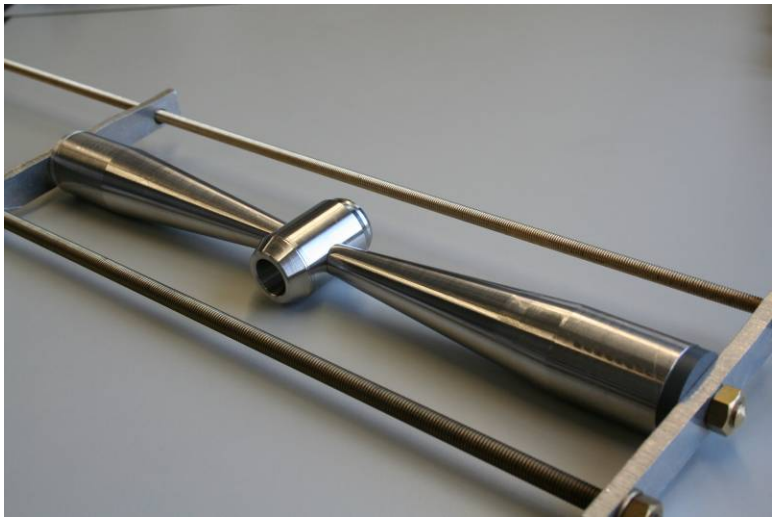


Figure JRA3.2.11: the stem of the CH

JRA3.2.3 Side Side Coupled Linac (LPSC, CERN and INFN-Na) (WBS 2.3.1 and 2.3.2)

JRA3.2.3.1. PI Mode Structure (PIMS) at CERN

The PIMS structure represents a valid alternative to the SCL. After completion of the measurements on the SCL model, the activities focused on the analysis of the PIMS, using a cold model, not funded by HIPPI but analysed inside HIPPI, and preparing for the construction of a prototype.

The PIMS has some advantages compared to the SCL, for instance an operating frequency of 352.2 MHz as in the DTL and the CCDTL, less coupled cells (7 compared to 117) and easier manufacturing and tuning procedures. On the other hand, pi/2-mode structures are widely used in comparable proton accelerators (SNS, JPARC) as they are electrically very stable against individual cell errors and beam loading effects. The electrical stability of the PIMS has already been studied in detail. The number of coupled cells and the coupling between cells has been chosen such that the statistical gap voltage error is below ±2.5%.

A detailed study of transient effects during the filling process or beam loading has been performed using the equivalent circuit model, following the advice of the HIPPI ESAC. Pi-mode structures are electrically not as stable as pi/2-mode structures. During the filling process, many modes are excited in the PIMS that transport the electromagnetic energy from the powered cell to its neighbours and backward. As the power increases, the relative difference in energy between cells gets smaller and the power in the pi-mode compared to the power in all other modes increases. In our case, the loaded Q-value is about 7500. The filling of the cavity takes roughly 10000 RF cycles. Already after 5000 cycles, the relative max-min difference of all 7 gap voltages is less than 1‰.

A 7 cell prototype for a high power test is being designed. The first PIMS module (T=104 MeV) has been chosen. The cell gap was optimised to give high shunt impedance while limiting the peak electric field to 1.8 Kilpatrick for the nominal power of 807 kW. A coupling of k=5.5% between adjacent cells guarantees a gap voltage error of less than ±2% for cell frequency errors of $|df| \leq 25$ kHz. A tuning ring will be used for a pre-tuning of each cell. Tolerances are defined to limit machining errors to ±200 kHz in frequency. Tuners will be used in all 7 cells. 5 of them will be fixed and 2 will be movable (in cell 2 and 6, respectively). The tuning range is 0 to +1.0 MHz. Simulations have been performed to compare tuners with and without RF-fingers. Without RF-fingers, currents flow around the tuners and produce additional losses (in our case up to 1%).

End cells will have a groove in form of a ring to lower the resonant frequency by 4.75 MHz. This is necessary to make the electric field of the π-mode flat in all 7 cells. Choosing appropriate dimensions of the groove (inner radius, outer radius and depth) provides the desired frequency shift and keeps the shunt impedance equal to the one of a centre cell.
The tolerances for the coupling slots were calculated by equivalent circuit simulations. An error of ±1‰ of the coupling factor (k=5.5%) leads to a gap voltage error of ±0.5% over all cells. This error in coupling is quite small, but as the coupling slot is large (L=86mm) a tolerance of dL= ±50 μm is required only. A waveguide coupler is being designed.

A scaled cold model of the PIMS at 704 MHz was built and measured (Figure JRA3.2.12). The first objective was to compare different coupling slot geometries. Simulations predict that a modified slot geometry would cause less losses in the coupling slot region. In order to verify these results, 3 models have been built, each consisting of 3 coupled cells. The reference module is equipped with slots of standard shape for a coupling coefficient of k=3%. The other 2 modules use the modified slots at k=3% and k=5%. All modules were tuned to resonate at the same frequency (705.150 MHz) and bead pull measurements were

performed to evaluate the R/Q values. They are compared to measurements (see the following Table). The agreement between simulations and measurements is very good, so that the simulated values can be trusted and the PIMS design can profit from a novel coupling slot geometry that allows to increase the coupling coefficient (electromagnetic stability) and the efficiency (effective shunt impedance per length) at the same time.

Figure JRA3.2.12: A 7 cell cold model of the PIMS.

Table : Comparison of simulated and measured R/Q values for 3 models equipped with different coupling slots.

slot type	simulated R/Q [Ω]	simulated R/Q, relative to std. slots [%]	measured R/Q, relative to std. slots [%]
standard slots, k=3%	214.1	100.0	100.0
modified slots, k=3%	222.2	103.8	104.1
modified slots, k=5%	228.4	106.7	106.8

The second objective of the cold model tests was to build a 7 cell module, to tune it, to measure the resonant frequencies of the TM_{01}-mode band and compare theses values to simulated ones in order to validate the models developed for our simulations. Figure JRA2.2.13 shows the measured field profile.

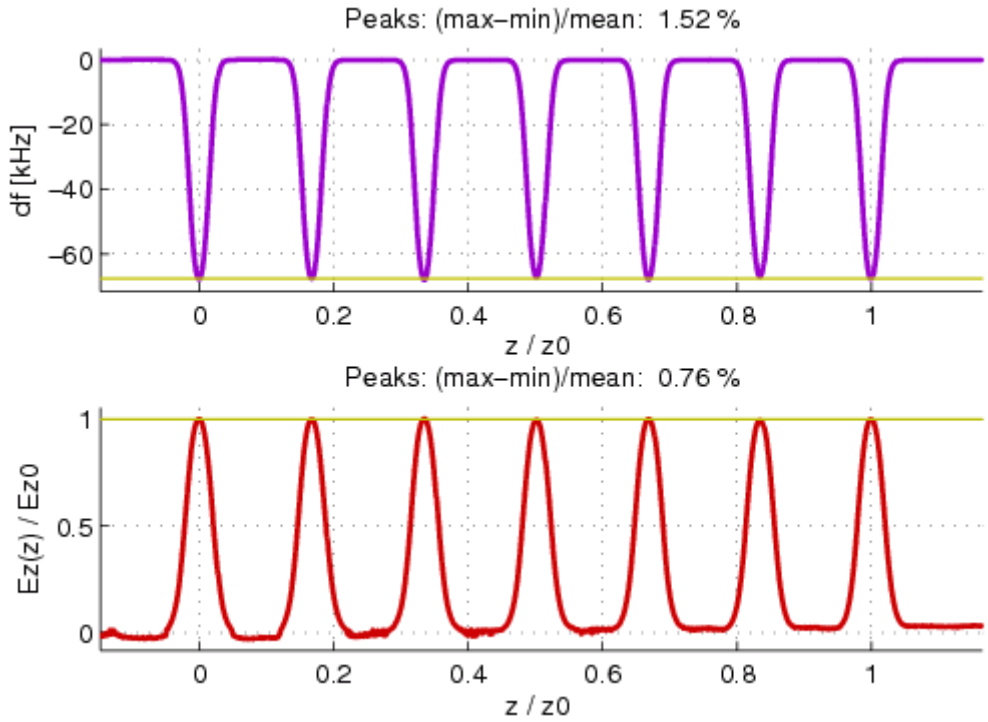


Figure JRA3.2.13: Bead pull measurement result of the 7 cell model. On the top, the frequency shift due to the perturbation induced by the bead, at the bottom the corresponding, normalised electric field along the symmetry axis.

The design of the hot prototype for the 1st PIMS module has been finished, a complete mechanical design is ready, technical drawings have been produced and the production has just started. Several issues have been investigated for this purpose:

1. Tuning rings have been studied (see Figure JRA3.2.14). The radial width is 70mm and the height is 7.7mm. In this way, the resonance frequency of each cell can be reduced by up to 2.5 MHz.

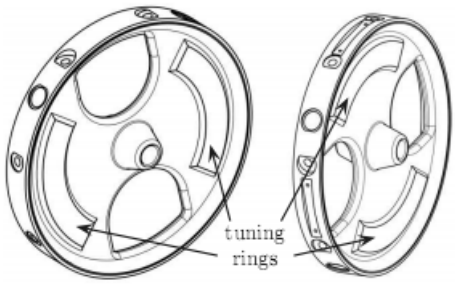


Figure JRA3.2.14: Tuning rings will be used to adjust the resonance frequency of each cell.

2. The end cells have been investigated (see Figure JRA3.2.15) as their resonance frequency needs to be lowered to attain a flat field in the pi-mode (by about 5 MHz for the PIMS hot prototype). The volume of the end cell is extended in a region of strong magnetic fields. The outer curvature radius is increased. These 2 features lead to an increase of the overall shunt impedance of about 4%.

Figure JRA1.2.15: An end cell of a PIMS module.

3. A wave guide coupler has been designed. The dimensions are w=50mm for the width (this was the maximum possible due to the available space for the central cell) and h=116mm for the height (this is enough to accommodate 2 cooling channels and provide enough space for screwing the cavity and the wave guide connection together). The length L was adjusted to reach the desired cavity to wave guide coupling coefficient of beta=1.2.

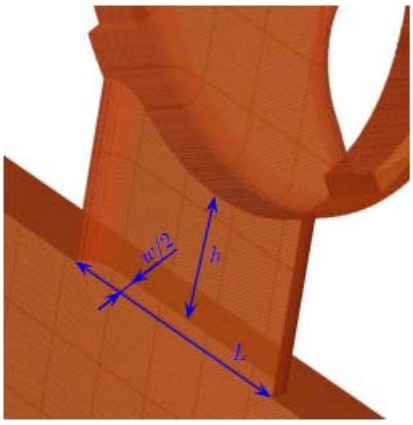


Figure JRA3.2.16: The wave guide coupler. L is the length, w the width and h the height of the coupling slot.

4. Effects that influence the resonant frequency have been analysed for the PIMS of Linac4: frequency shift due to change from air to vacuum Δf≈ +114 kHz, frequency shift due to weld shrinkage of 0.2 mm on each weld Δf≈ -310 kHz, frequency change caused by the ring needed for a sophisticated welding solution Δf≈ -190 kHz, frequency shift due to thermal expansion for a duty cycle of 10% Δf≈ -200 kHz.

For a comparison of different accelerating structures, the effective shunt impedance per length has been calculated as a function of the kinetic energy of the particles to be accelerated. PIMS and SCS (side coupled structure) for low duty cycle and high duty cycle operation are compared, see Figure JRA3.2.13.

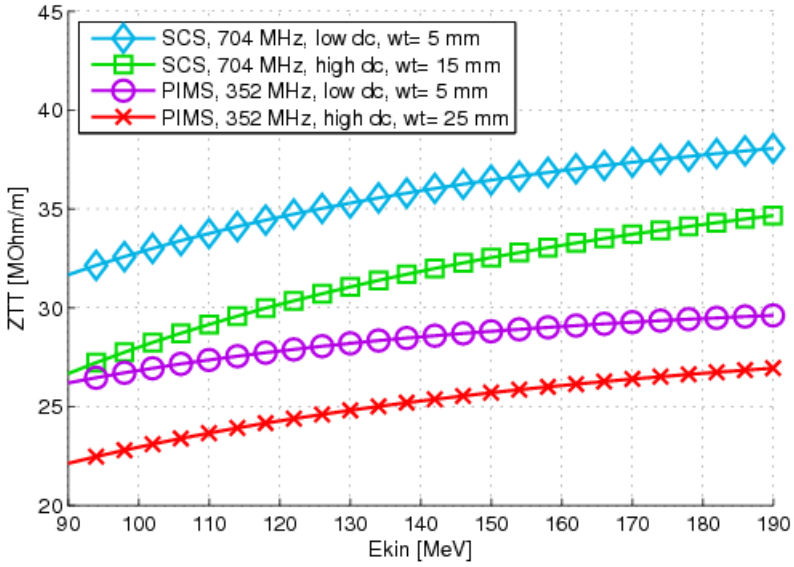


Figure JRA3.2.17: The effective shunt impedance per length in dependence of the particle energy for different accelerating structures and different duty cycles.

Several effects lower the shunt impedance of the PIMS compared to the basic cell simulated with Superfish. A detailed study has been carried out and the results are listed in the following Table.

Table : Summary of effects that reduce the shunt impedance of a PIMS module.

reason	**ZTT reduction [%]**
coupling slots	11.0
surface roughness	7.0
wave guide coupler (1/7 for ZTT total)	2.0
end cells (2/7 for ZTT total)	-4.0
reduction in conductivity due to heating **(SPL duty cycle 10%)**	3.5
reduction in conductivity due to heating **(Linac4 duty cycle 0.1%)**	0.0
e-beam welding groove for welding discs and cylinders	2.0
tuning rings (df= -1.5 MHz … +1.0 MHz)	3.3
piston tuners	1.0
sum, Linac4, duty cycle 0.1%	**22.3**
sum, SPL, duty cycle 10%	**25.8**

JRA3.2.4 Cell Coupled DTL (CERN) (WBS 2.4.1 to 2.4.3)

CCDTL final note was released last year in the CARE-Report-2007-036-HIPPI, and this task is now completed.

The revision of the design after the high-power tests of the two prototypes took place during a meeting at CERN (March 10-13) between the CERN experts and the Russian experts who have contributed to the second ("ISTC") prototype. In preparation for the finale decision on the mechanical solutions to be adopted, different tests were made in Russia and reported at the meeting.

Test with various surface conditions of the flanges were made in Snezhinsk. The flange surfaces were rectified and achieved a roughness of $0.28 < Ra < 0.32$, which is finer than specified for the use with Helicoflex gaskets. Tests with HN and HNV type gaskets showed no vacuum leaks. After copper plating the surface, there was no leak with an HNV gasket, but a subsequent test with a HN gasket produced a leak. Looking at the gasket it seems that a small surface area was ripped from the aluminum gasket. It was not clear if this leak was a consequence of the previous test with the sharp edged HNV gasket. After a 2nd copper plating the flange was leak tight with an HN gasket. It was concluded that the flange surfaces must be rectified.

JRA3.2.6 Overall Progress of Work Package 2

Table 4.2a : Status of the Sub tasks in WP2 which are supposed to have started according to the MS project breakdown in Annex 1

WBS #	Title	Original begin date (Annex 3)	Original end date (Annex 3)	Estimated Status	Revised end date
2.1	**Drift Tube linac**				
2.1.1	DTL Design	July 2004	June 2007	100%	End 2007
2.1.5	DTL Coupler prototype construction	July 2005	June 2007	100%	End 2007
2.1.4	DTL beam dynamics design	January 2004	June 2008	100%	
2.2	**H mode DTL**				
2.2.2	RF cold model design & construction	January 2004	January 2005	100%	
2.2.3	RF model construction	December 2004	June 2005	100%	December 2008
2.3	**Side Coupled Linac**				
2.3.2	RF model mechanical design	July 2004	December 2004	100%	
2.3.3	RF model construction	January 2005	December 2005	100%	
2.3.4	RF model testing	January 2006	June 2006	100%	End 2007
2.3.5	SCL module design	January 2006	June 2007	100%	December 2007
2.4	**Cell Coupled DTL**				
2.4.2	Pre-prototype high power RF tests	July 2004	March 2005	100%	July 2006
2.4.3	Prototype mechanical design	January 2005	December 2005	100%	
2.4.4	Revision of design	October 2005	October 2006	100%	December 2007
2.4.5	Prototype high-power RF tests	August 2006	June 2007	100%	

Table 4.2b: Status with respect to the interim reports and deliverables due in 2007 according to the MS project breakdown

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
2.1.1	DTL design	March 2007	Completed	June 2008
2.2.3	H mode prototype construction	December2007	Completed	Octobre2008
2.4.4	CCDTL design	June 08	Completed	
2.1.1	Drift tube linac optimized design	December 08	Delayed January 09	January 2009
2.1.2	H mode DTL design finished	December 08	On schedule	December 2008
	Comparative assessment normal conducting structures	December 08	On schedule	January 2009

JRA3.3 Work Package 3: Superconducting Accelerating Structures

JRA3.3.1 Activities at INFN-Milano

JRA3.3.1.1 Cavity assembly with tuner (subtask 3.1.13)

All the components needed for the future test of 5 cells cavity (cavity A) in CryHoLab are available. The last one was the magnetic shielding, which is now integrated to the cavity before the final welds of the Titanium Helium tank.

JRA3.3.2 CEA SACLAY

JRA3.3.2.1 Construction of cavity B (subtask 3.1.6)

The cavity B has been equipped with its Helium tank, stiffening wings are welded, as well as the threaded rods needed for the cold tuning system and for connection to the support and handling tools. After delivery at Saclay, the measurement of the field flatness showed that no degradation occurred during the transportation (field flatness = 89%). A new chemical polishing has been performed (15 microns) and the preparation process was applied (High pressure Rinsing and assembly in clean room).

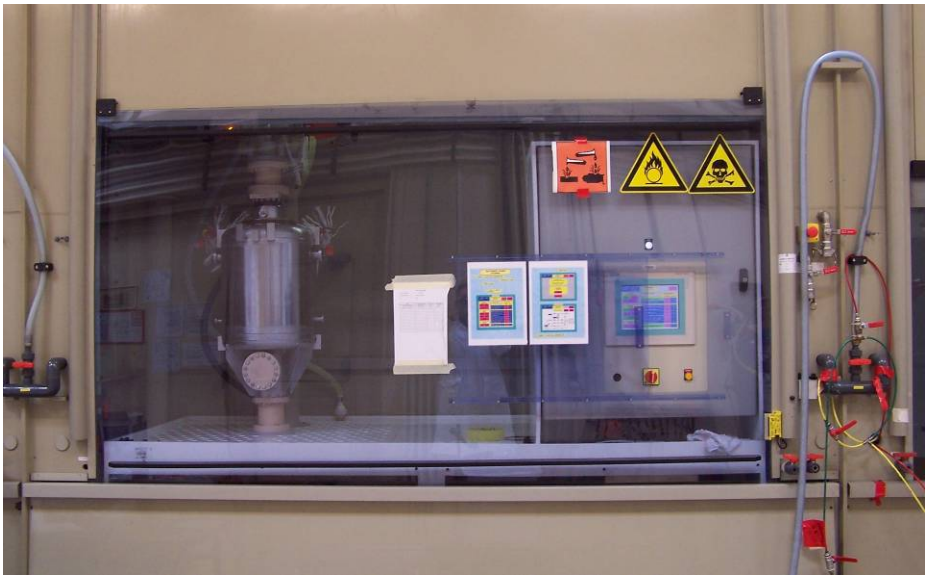


Figure JRA3.3.1: Chemical treatment of the Cavity B

JRA3.3.2.2 Power coupler design and engineering (subtask 3.1.7)

All the pieces of the couplers have been fabricated and are at Saclay. Many technical problems were encountered during the fabrication phase (precise machining of the coupler cold parts, deformation of pieces after welding, etc.). For this reason, the coupler fabrication is delayed.

The outer conductor of the cold part of the coupler has been plated with 10 microns copper at CERN, using microwave sputtering (fig. JRA3.3.2). The doorknobs, made of aluminium, have been tested in Saclay. As expected, their bandwidth is only a few MHz (fig. JRA3.3.2).


Figure JRA3.3.2: Copper plating of the outer conductor (left)
Doorknobs with adaptors for RF measurements (right)

The coupler is being assembled on the "coupling box" in Saclay clean room, and the conditioning will start in January 2009 (deliverable foreseen for February 2009). s

JRA3.3.2.3 RF source testing (subtask 3.1.11)
All the equipments of the 704 MHz-1MW test stand have been installed in 2007. The power tests at nominal duty cycle of all the components are finished. In order to operate the test stand efficiently, the control system and interlock thresholds have been optimised.

JRA3.3.2.4 Vert. test & final welding of cavity B (subtask 3.1.14)
Results of RF tests
The cavity has been tested in May 2008 in a vertical cryostat after a fast cooldown. The Q_0(Eacc) characteristic curve at T = 1.8 K is shown on figure JRA3.3.2. A multipactor (MP) barrier was encountered between 8 and 10 MV/m, and was processed in about 2 hours. The field emission onset field is 10 MV/m. The electron loading becomes significant (detuning observed) above 13 MV/m and could not be processed. The cavity operation was limited by a thermal quench. At the maximum Eacc=15 MV/m, the peak surface fields are Epk= 50 MV/m and Bpk=83 mT. After this test, the cavity was vacuum baked using standard parameters (115 °C for 70 h) inside the vertical cryostat and cooled down again without any venting or processing. The BCS surface resistance was reduced by 25% (see fig. JRA3.3.3). The MP barrier reappeared, and the processing took 3 hours, longer than before baking, which might be explained by an increase in the SEE coefficient. However, the cavity performance at 1.8 K was not changed by the baking process. The cavity has been simulated with the MUPAC multipactor code. The observed MP barrier corresponds to a 2 point resonant trajectory in the equator region starting at Eacc= 8.1 MV/m.

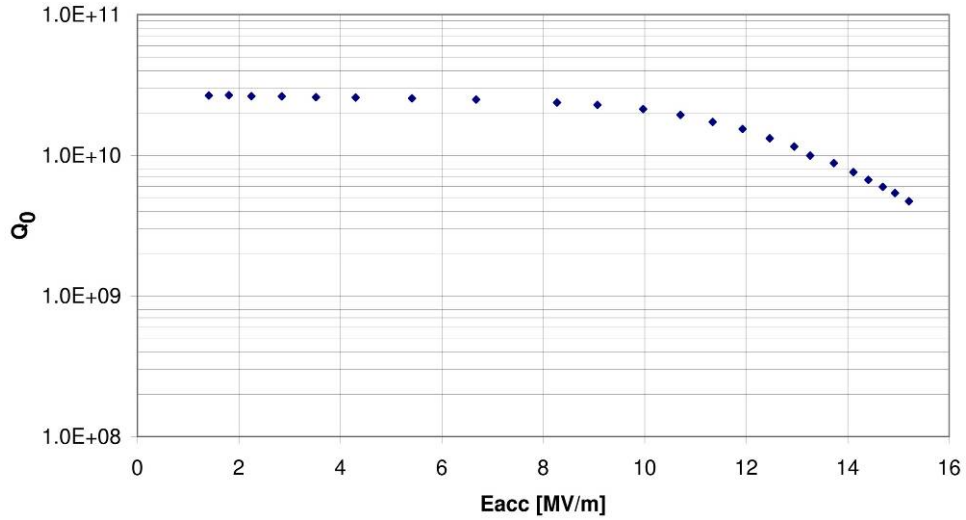


Figure JRA3.3.3: Q0/Eacc curve measured for the cavity B.

In order to keep the cavity length as constant as possible, a stiffening tube linking the helium tank to the otherwise free cavity end was installed at the position of the tuning system (see fig.4.3.4). This spacer ensures a high external stiffness k_{ext} to allow the static K_L to be measured in optimal conditions. Its efficiency can first be assessed when pumping on the He bath to reach 1.5 K. The He pressure drops from atmospheric pressure to a few mbar.
The cavity detuning is recorded during this phase (fig. JRA3.3.4). The measurement of the static K_L at 1.8 K is shown on figure JRA3.3.3.5. Due to slight temperature variations during the measurements, the He pressure was not constant, therefore the data have been corrected using the experimental df/dP coefficient. The data set is limited to Eacc<13 MV/m since above this value, the cavity is loaded with field emission electrons.

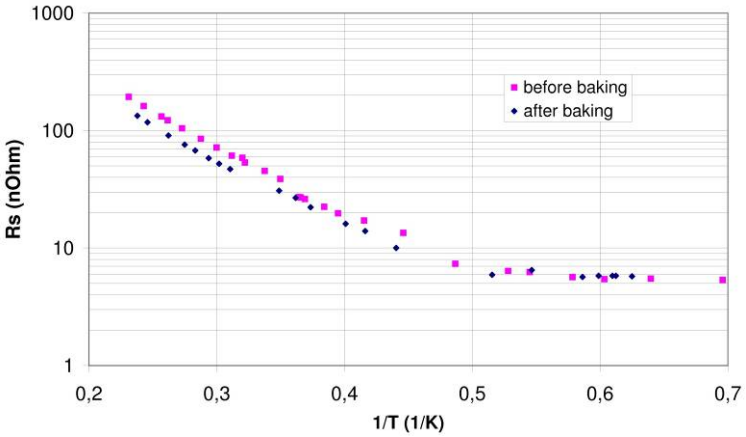


Figure JRA3.3.4: Cavity with helium tank and stiffening tube (left)
Measurements or the surface resistance during RF test (right)

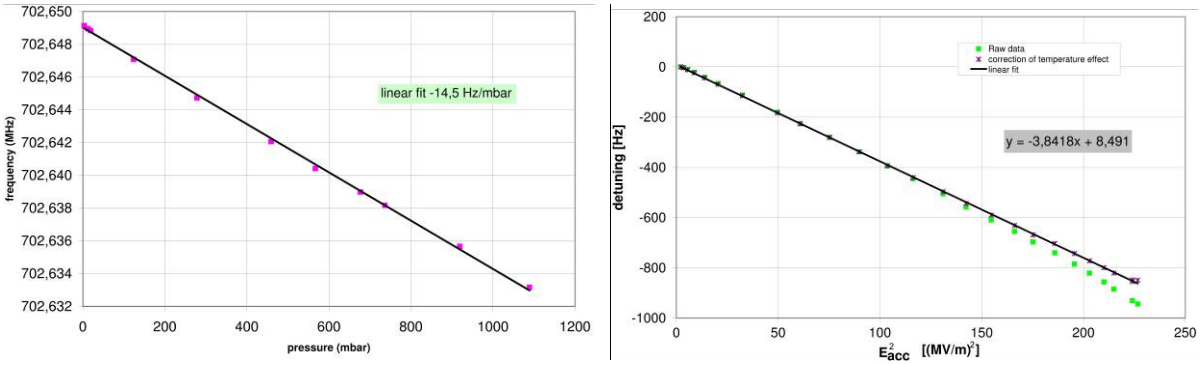


Figure JRA3.3.5: Helium pressure sensitivity measurements (left). Lorentz detuning measurements (right)

Piezo tuner

The fast piezo tuner, based on the Saclay-II tuner design, has been optimized for the 700 MHz cavity. The piezo support consists of a stainless steel elastic frame holding a single 30 mm piezo stack. It is designed in order to apply an adjustable preload on the piezo, limiting the influence of the spring constant of the cavity. The slow tuning range is +/- 2.5 MHz. The tuner is attached between the He tank and the square shaped beam tube flange opposed to the power coupler port (fig. JRA3.3.6) in such a way it doesn't increase the overall length of the cavity.

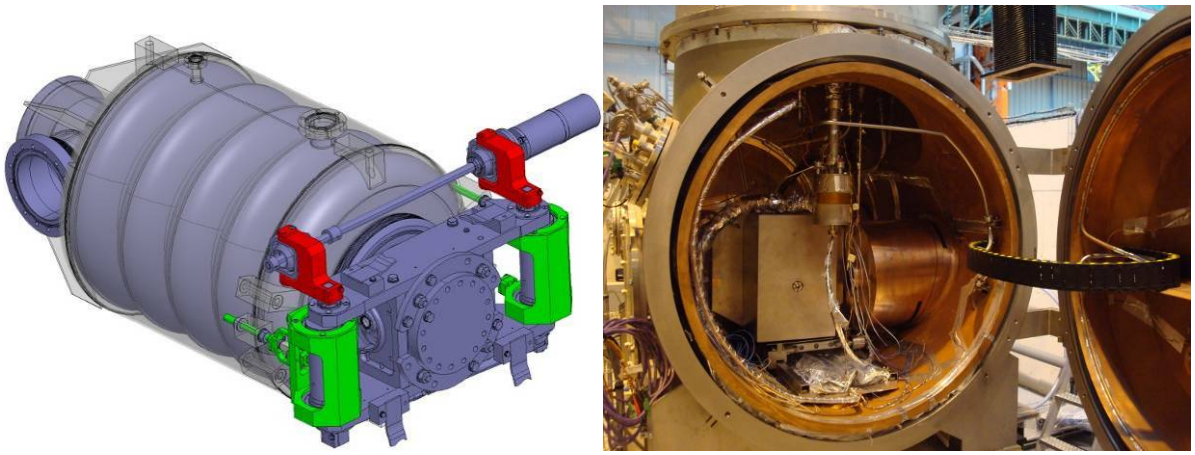


Figure JRA3.3.6: Cavity equipped with He tank and piezo tuner (left)
The cavity with its magnetic shield inside Cryholab (right)

The CryHoLab horizontal cryostat is only partially shielded therefore a magnetic shield for the cavity had to be designed. The average magnetic field in CryHoLab at its new location is 20 μT. The surface resistance measured on the cavity is 6 nΩ at 1.8 K at very low accelerating field in a vertical cryostat which is well shielded. In order to keep the extra superconductor surface resistance due to trapped magnetic flux below 2 nΩ in CryHoLab, an extra shielding factor of 33 is needed, to reach a maximal residual field of 0.6 mT. The shield has been designed with Vector Fields OPERA code. Much effort was done to reduce the magnetic field penetration due to the coupler port. The shield is operating at 1.8 K and surrounds both the cavity and the tuner. It has been fabricated out of 1.5 mm thick Cryoperm® alloy. It can be seen partially on figure JRA3.3.5.

JRA3.3.3 FZJ Activities

JRA3.3.3.1 ***Manufacturing of 352 MHz Multi-gap Resonator (subtask 3.2.10)***

All parts of the cavity have been fabricated and cavity preparation started end of May with the chemical etching. The Ecole des Mines, Evry, Paris (C2P) could successfully coat the outer surface of the end cup using copper plasma spraying. The layer had a maximum thickness of about 19 mm and took about 8 days of effective spraying work. In the central part of the end cup the visual inspection showed a circular crack in the copper.

Ultra-sonic inspections in Jülich indicated a uniform copper layer all over the end cup. The circular crack turned out not to change during 10 cycles of cooling down by immersing in LN_2 and subsequently warming up to room temperature. No changes of the copper coating could be detected by ultra-sonic inspection. However, it turned out that the available spraying robot would need major modifications to allow proper handling of the complete cavity (120 kg on the turning table, process optimization for long spraying times, and twice about a week up-time). This upgrade would have caused a delay of the project beyond its planned end date and would have exhausted the financial frame of the project. Thus a different approach for cavity stiffening was used.

Figure JRA3.3.7: End cup as received from plasma spraying

The spokes have been welded to the cavity body (Fig. JRA3.3.8 and JRA3.3.9). Prior to welding the end cups to the cavity a last dimensional control was done. After preparing the remaining contours for electron beam welding the cavity could be closed. With the help of CEA Saclay a time slot for BCP could be found. The thickness of the niobium sheets could only be measured in the regions of large radii of curvature (ultra sonic measurement heads). Especially in the end cap regions no reliable measurements were possible. Two BCP runs were planned, each with the cavity in horizontal position, sending the acid in via the lower coupler port, and taking the out coming fluid from all three other openings back to the closed acid circulation system (Fig. JRA3.3.10). Filling and emptying took about 8 minutes. Fresh acid circulated for about 70 minutes through the cavity. For the second run the flanges were detached, and the cavity was turned about the horizontal axis by 180 degrees before the flanges were re-attached again. After the second BCP process HPR could immediately follow at Orsay University (Fig. JRA3.3.10 – see Orsay report).

Figure JRA3.3.8: 352 MHz cavity with all spokes welded into the cavity body.

Figure JRA3.3.9: Niobium end cup on the precision measurement machine

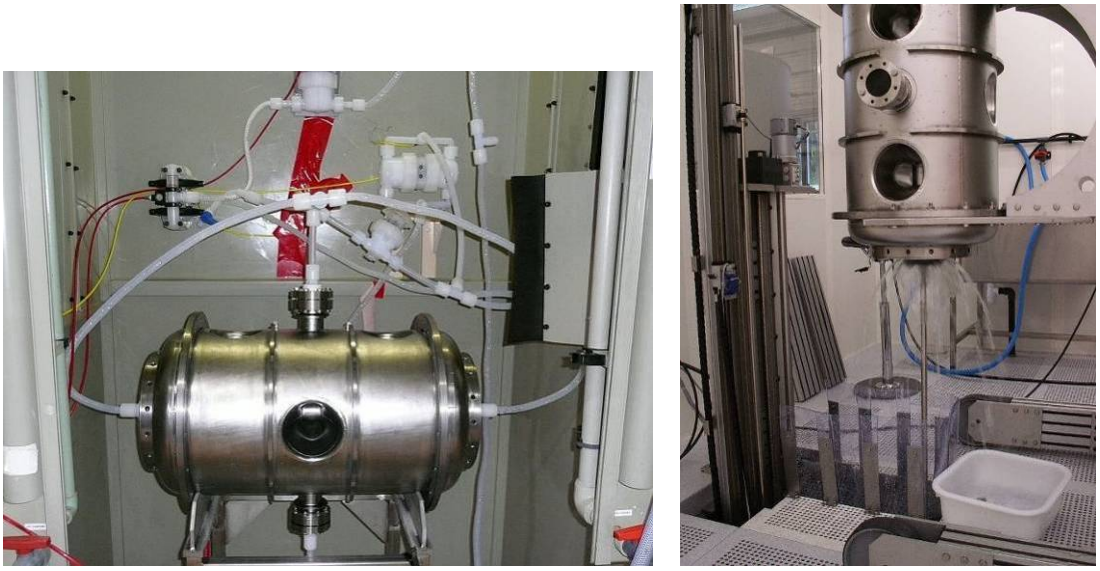


Figure JRA3.3.10: Chemical preparation of the 3-spoke cavity at Saclay (left), High Pressure Rinsing of the 3-spoke cavity at Orsay (right)

The amount of removed niobium was estimated via the duration of the treatment. Fresh acid could be used, and the removal was estimated to be about 130 µm. The ultra sonic measurements indicated that the removal was not homogenuous. However, the measurement conditions (curved surfaces) are not in favour of ultra sonic heads. Quality of surface preparation will be checked by measuring the RF performance of the cavity.
The clean and evacuated cavity was shipped back to Juelich. In the last fabrication step the small stiffening rings were laser welded to the cavity body. In parallel modifications to the Juelich bath cryostat have been made to allow proper cavity mounting.

JRA3.3.3.2 ***Measurements of the 352 MHz Multigap Resonator***

Preparation of the cavity for insertion into the vertical bath cryostat included attaching thermo-elements, installing a siphon for removal of He gas from the lower end cap, installing RF lines for (critical) coupling and for the field probe, line for vacuum pump, etc (Figure JRA3.3.11). Cool down revealed no problems, and a first measurement could start quickly (Figure JRA3.3.12). For the second measurement the upgrade of our testing facility for 2K operation could be verified. The raw data are given in the above diagram. Detailed analysis and further measurements are still in progress.

Figure JRA3.3.11: The 3-Spoke cavity in the cryostat frame at Juelich

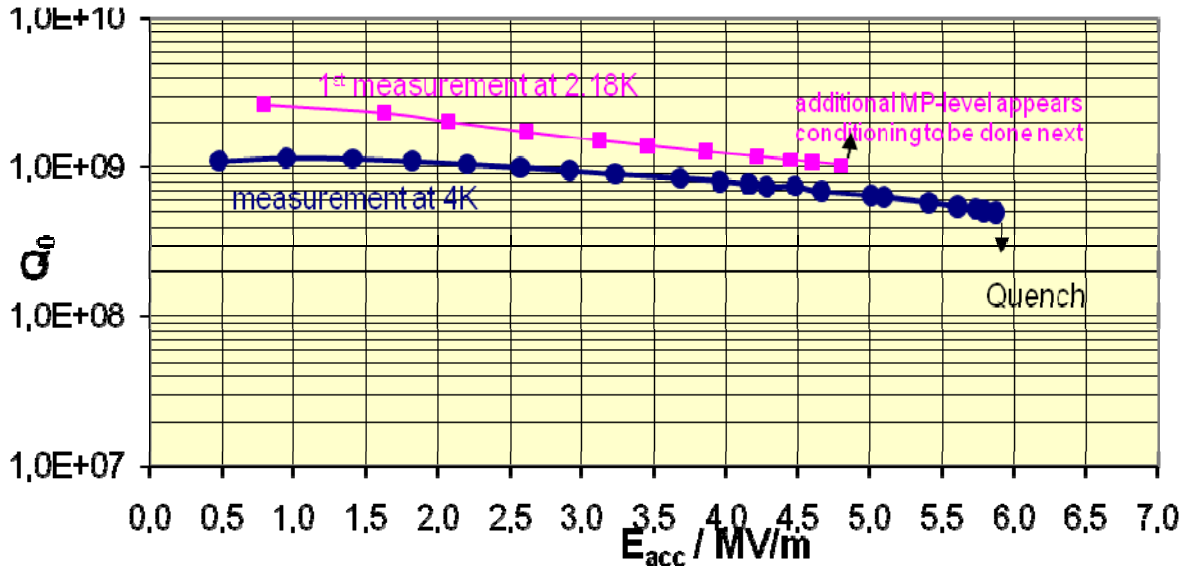


Figure JRA3.3.12: First measurements of the 3-Spoke cavity

JRA3.3.4 CNRS-Orsay Activities

JRA3.3.4.1 Evaluation of 352 MHz 2-gap prototypes (task 3.2.3)

Horizontal cryostat CM0

New test at 4K in May 2008 with the beta 0.15 spoke cavity and its tuning system equipped with 2 piezo-actuators.

Total static losses reduced to 5 Watts (instead of 10 Watts in the first configuration) thanks to a better thermalization of the tuning system (extra copper braids, see figure JRA3.3.13), the helium buffer (new fastening lugs) and the frame support (connected to the helium vessel).

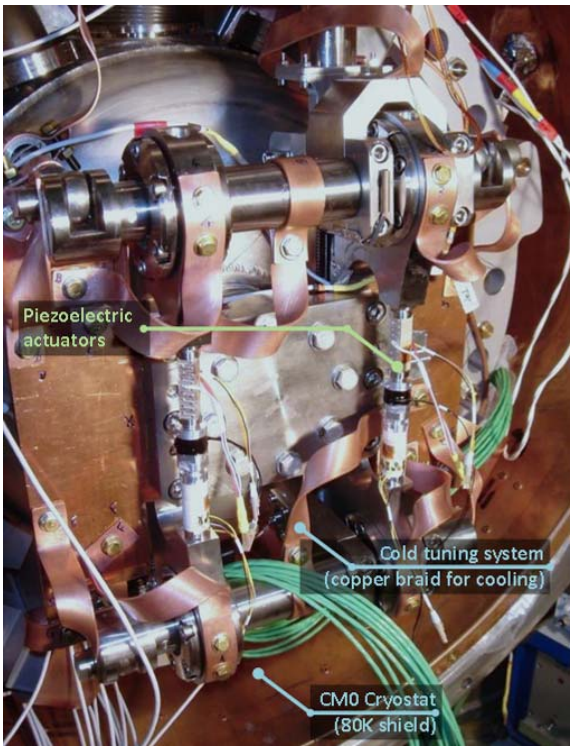


Figure JRA3.3.13: Tuning system of the spoke cavity with its piezoelectric-actuators

Test of the tuning system with piezos

First test of piezoelectric-actuators has been done on the tuning system. One of them acted as a sensor. Preloading (of about 2 kN) of the piezo was done thanks to the expansion of an aluminum piece by heating it up. The ceramic bloc (see sketch in figure JRA3.3.14) thermally isolated the aluminum piece from the rest of the tuning system.

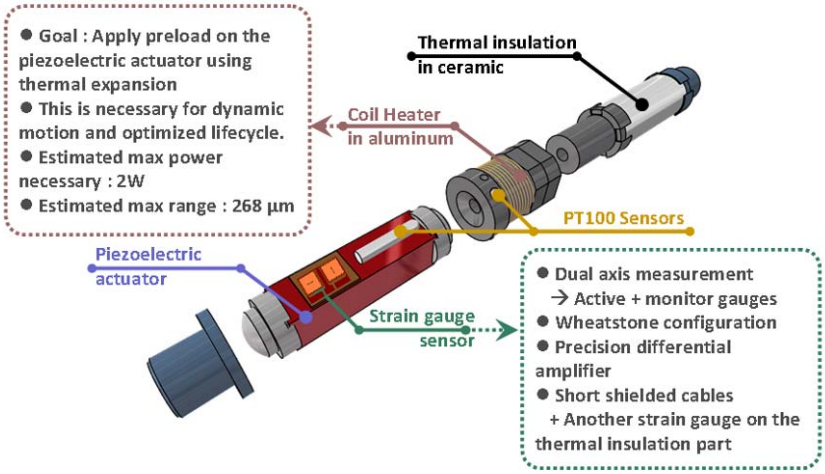


Figure JRA3.3.14: Sketch of the piezoelectric set-up

We varied the voltage from 0 to 150 V, giving us a total stroke of 11 µm and a frequency variation of 1.1 kHz (see Fig. JRA3.3.15).

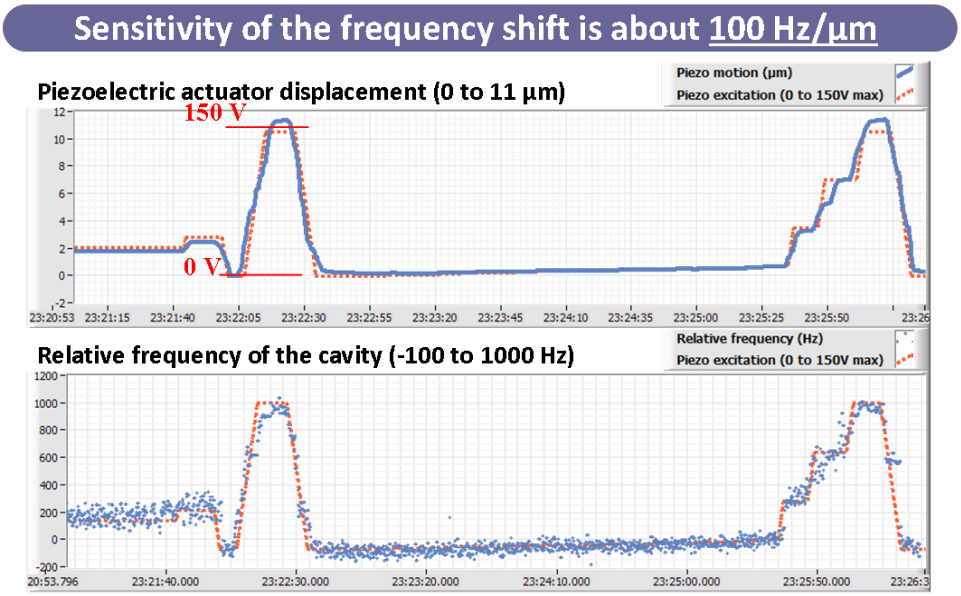


Figure JRA3.3.15: Response of the cavity frequency while changing the piezoelectric length

JRA3.3.4.2 Construction of coupler prototype (task 3.2.5)

Antennas have been welded on the windows (see Figure JRA3.3.16, left). The couplers have been connected to the coupling cavity (see Figure JRA3.3.16, right). Unfortunately, the frequency of the coupling cavity is far from the target (i.e. 347 MHz measured for 352 MHz targeted). A coarse tuning (total range of 1.5 MHz) was foreseen by mean of 4 tuning plungers located on the cavity's equator but the frequency shift which was measured is too large. In that configuration, the couplers could not be conditioned (mainly due to the narrow bandwidth of the 10-kW amplifier).

Figure JRA3.3.16: RF coupler with its antenna (left), test bench with the pair of couplers

Coupling cavity

This cavity is needed for the RF conditioning and tests of the RF couplers. It has been delivered by end of July 2008 (Fig. JRA3.3.17) and the frequency tuning to 352 MHz has to be done (with bulk copper plungers).

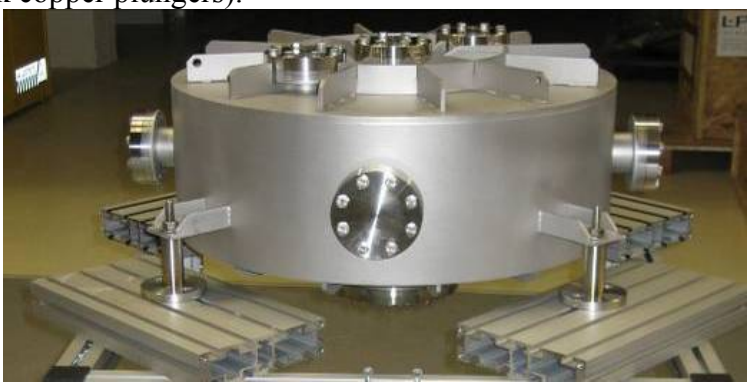


Figure JRA3.3.17: New coupling cavity

RF coupler

2 loops (made of copper tube) have been brazed on the connecting tube between the coupler window and the cavity flange. This circuit will be cooled by liquid nitrogen and should intercept the heat flux coming from 300K.

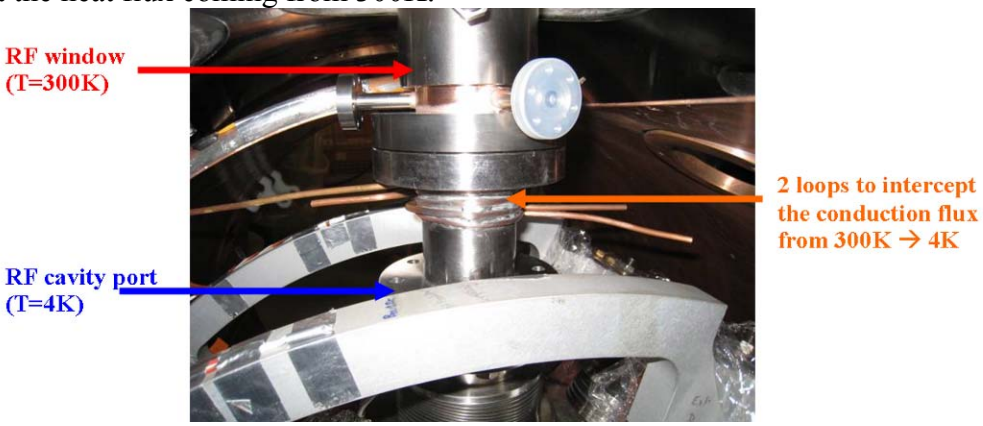


Figure JRA3.3.18: RF coupler mounted on the spoke cavity

The assembly of the RF couplers on the coupling cavity took place in October in the Orsay clean room.

JRA3.3.4.3 RF design of 352 MHz multi-gap resonator (subtask 3.2.6)

The stiffening systems were defined in order to reduce the Lorentz forces detuning. A complementary simulation has been realized to study the influence of these systems on the structure's eigenmodes.

Four possibilities considered in order to stiffen the 4 mm triple Spoke cavity are shown in the figure JRA3.3.19. On the left side, only eight niobium ribs (4 cm x 2.5 cm) are welded on the end-cups. This option has an alternative: the copper coating with a variable thickness (maximum 20 mm). On the right side, additional rings (1 cm x 2.5 cm) are placed on the cavity's cylindrical body.

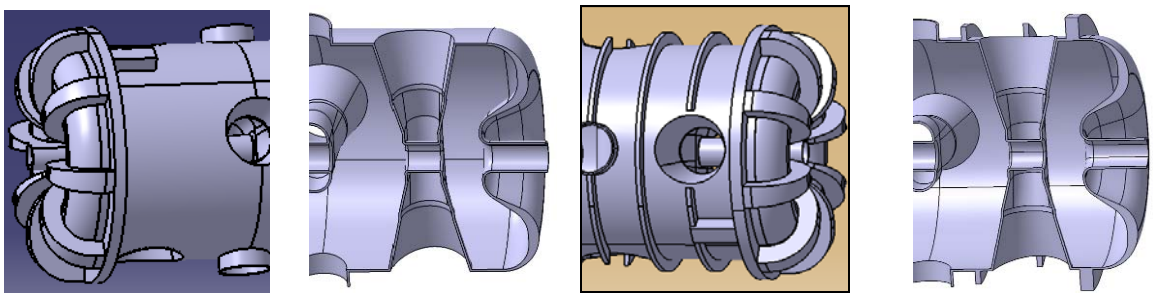


Figure JRA3.3.19: Cavity stiffening scheme (8 ribs; Cu coating; ribs + rings; Cu coating+ rings)

mode	Without stiffener	8 ribs	Cu coating	Ribs + rings	Cu coating + rings
1	243	387	218	457	438
2	453	499	414	511	580
3	576	518	430	535	593
4	621	551	441	658	615
5	678	562	548	681	685

Table: triple Spoke cavity fixed on four supports arranged axis-symmetrically; frequency of first mechanical vibration modes (Hz).

The simulations results concerning the structure's vibration modes are presented in table 1. The first observation is that the ribs and rings added to the cavity's cylindrical body allow a rise of the first mode of vibration. The copper coating is limited in thickness (maximum 20 mm no uniform) compared to the rings (25 mm). The second observation is that in any case the first vibration mode is sufficiently high: more than 200 Hz. This result comes from the axis-symmetrical fixation, if the cavity is fixed by the beam pipe, the lower modes concerning the cavity's rotation appears, the first frequency is 45 Hz for the cavity stiffened by ribs and rings and 53 Hz for the cavity stiffened by copper coating and rings. So it's highly important to fix the cavity axis-symmetrically

The first cavity prototype of 352 MHz multigaps resonator has been built at FJZ Jülich. The final stiffeners realized on the prototype, essential elements for reducing the Lorentz forces detuning, are slightly different from the former proposed versions because of technical constrains and timing. The stiffeners on the prototype consist in two niobium ribs (10mm x 20mm) welded on cylindrical body, two rings (18mm x 40mm) welded at the extremities of the cylinder and a niobium ring (18mm x 35mm) at each end cup, see figure JRA3.3.14. The prototype has been cleaned at IPN Orsay (Fig. JRA3.3.3.20). The cavity is fixed by the rings on the cylinder.

Figure JRA3.3.20: 3-Spoke prototype with its stiffeners

Accord to the final prototype design, the coupled numerical calculations have been performed at IPN Orsay using the simulations package including the CAD code Catia, the mechanical code Cast3m and the electromagnetic code Opera3D.

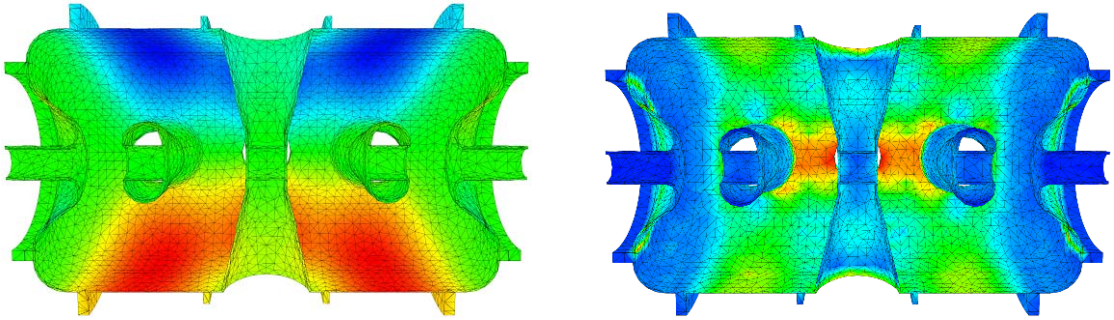


Figure JRA3.3.21: Deformation due to Lorentz forces (left), Von Mises stress under I bar pressure (right).

The results of the simulation estimate the Lorentz forces factor to be -1.4 Hz/(MV/m)**2 for the stiffened prototype while this factor is -5.5 Hz/(MV/m)**2 without any stiffener. The pressure sensibility has been also evaluated since the cavity is operated at vacuum condition; the frequency shift due to the pressure at the external side of the cavity is 9.24 Hz/mbar.
The dynamical simulations results concerning the structure's vibration modes are satisfying because the first mode is very high:

mode	Without stiffener	Stiffened 1st prototype
1	243	578
2	453	669
3	576	685
4	621	695

The simulations results predict the good mechanical behaviours for this first prototype; it could be confirmed by the tests realized at FJZ Jülich.

JRA3.3.5 IAP-FU Activities

JRA3.3.5.1 ***Measurements of tuning system (subtask 3.3.3)***

The horizontal cryostat has first been prepared to include the piezo elements. Therefore we had to separate the axial beam pipe to insert the piezo tuner, which has been welded to the parts. It will be located between the inner cold mass containing the helium and the outer room temperature vacuum vessel. The slow mechanical tuner was equipped with a stepping motor together with an appropriate digital control unit for driving the mechanism with a computer.

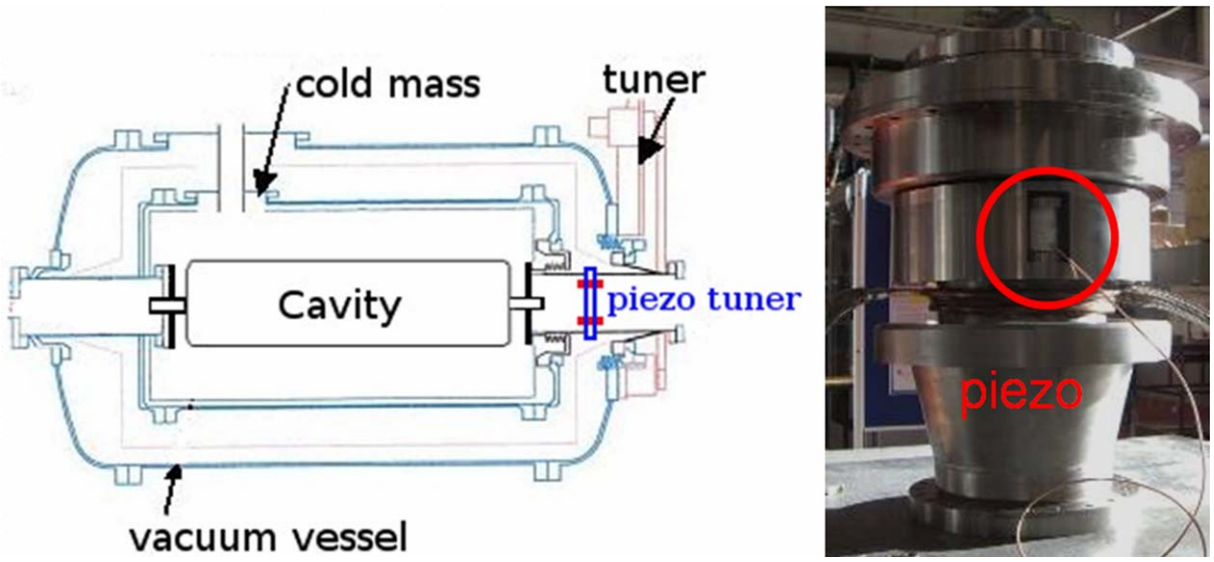


Figure JRA3.3.22: Scheme of the cryostat with tuner positioning. Three piezo elements will be used for the fine tuning

All parts of the horizontal cryostat were assembled and aligned. A vacuum test of the inner cold mass has been performed successfully. The liquid nitrogen cooling system is prepared and closed now; it has been extended by an additional cooling loop at the pump port of the cavity. A first cold test is currently performed. A driver for the slow mechanical tuner has now been designed and constructed and allows either a manual or a computerized operation. This device has passed a first test run. The driving speed of the stepping motor can easily be changed and will be adjusted during the first performance test with the cavity. Before that there will be a cold test of the cryostat without cavity, to check for cold leaks and thermal issues. The piezos are currently underlying a second performance test regarding the frequency dependence of their actuation. The basic idea is to transform the translation of piezo into an angle variation of a mirror, which can be observed by a reflected laser beam.

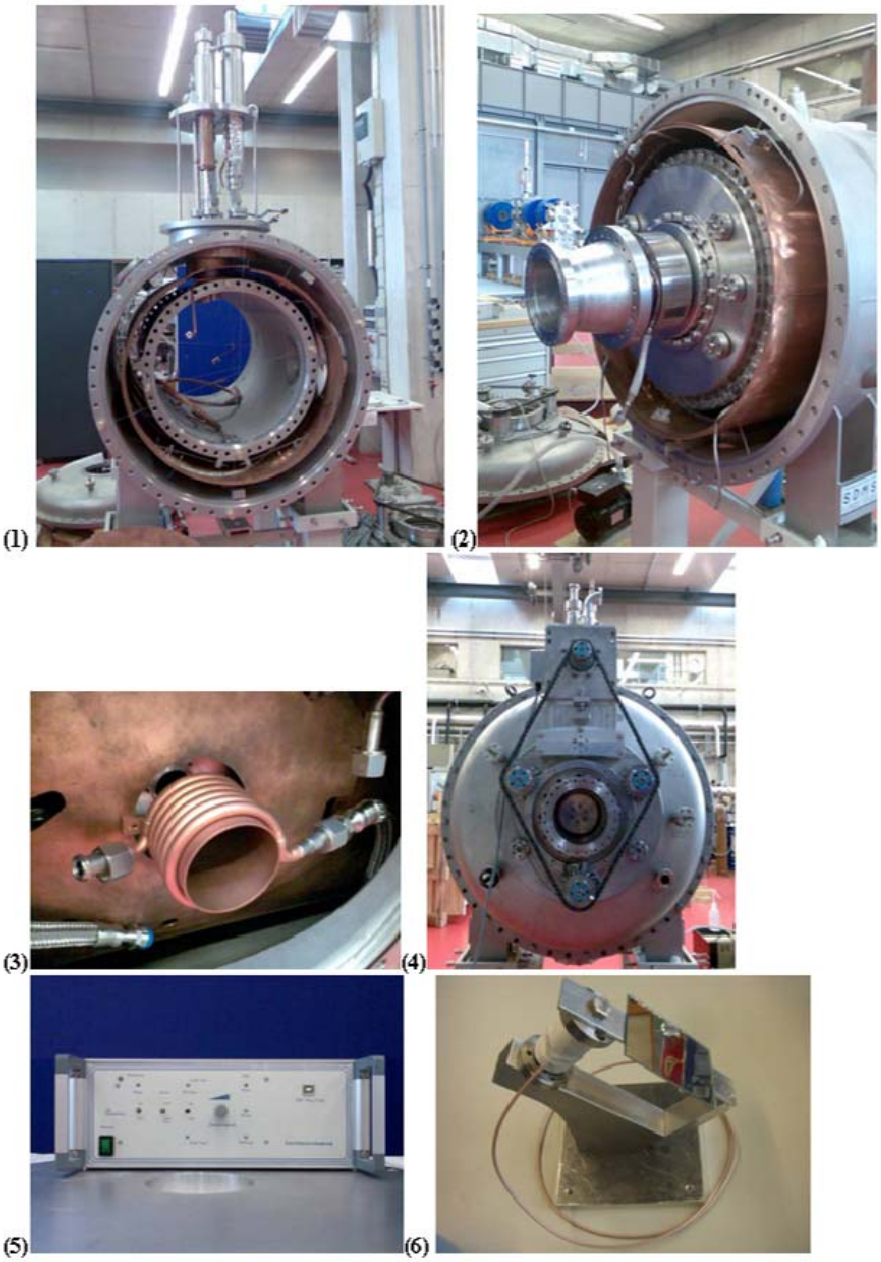


Figure JRA3.3.23: (1) The cryostat during alignment procedure (2) Beam lead-through including piezo retainer (3) Cooling loop at pump port (4) The slow mechanical tuner at performance check (5) The control unit of the mechanical tuner (6) Set-up for piezo frequency response measurement.

The performance test with the cavity is scheduled for January 2009 and its results will be reported in the HIPPI deliverable.

JRA3.3.6 Overall Progress of Work Package 3

Table 4.3a : Status of the Sub tasks in WP3 which are supposed to have started according to the MS project breakdown in Annex 1

WBS	Title	Participants	Original begin date	Original end date	Estimated Status	Revised end date
3.1	**Elliptical cavities**					
3.1.2	Tuner design	INFN	07 / 2004	12 / 2005	100%	
3.1.3	Integration of piezo design	INFN	07 / 2004	12 / 2005	100%	
3.1.4	Tuner construction	INFN	01 / 2006	06/2006	100%	02/2007
3.1.6	Construction cavity B	CEA	11 / 2005	06/2006	100%	03/2007
3.1.7	Power coupler design & engineering	CEA	01 / 2005	04/2006	100%	
3.1.9	RF coupler construction	CEA	05 / 2006	05/2007	100%	11/2007
3.1.8	RF source order and preparation	CEA	07 / 2004	12/2006	100%	
3.1.10	Modulator preparation for test stand	CEA	01 / 2005	12/2006	100%	01/2007
3.1.11	RF source testing	CEA	01 / 2007	04 / 2007	100%	06/2007
3.1.12	High power pulsed tests	CEA	05/2007	06/2007	50%	02/2009
3.1.13	Cavity A assembly with tuner	INFN	06/2006	03/2007	100%	05/2008
3.1.14	Vert. test & final welding of cavity B	CEA	07/2006	03/2007	80%	06/2009
3.2	**Spoke cavities**					
3.2.2	Evaluation of 700 MHz prototype	FZJ	09 / 2004	09 / 2005	100 %	
3.2.4	Design of coupler prototype	IPNO	01 / 2004	12 / 2005	100%	
3.2.5	Construction of coupler prototype	IPNO	01 / 2006	06 / 2006	100%	12/2006
3.2.8	Final design of 352 MHz multigap res.	FZJ-IPNO	07 / 2005	06 / 2006	100 %	
3.2.9	Test of coupler prototype	FZJ-IPNO	07/2006	07/2007	100%	12/2007
3.2.10	Manufacturing of 352 MHz multigap res	FZJ-IPNO	04/2006	09/2007	100%	12/2007
3.3	**CH resonators**					
3.3.1	Design of tuning system	IAP-FU	01 / 2004	06 / 2006	100 %	
3.3.2	Construction of tuning system	IAP-FU	01/2006	12/2006	100%	12/2007
3.3.1	Measurements of tuning system	IAP-FU	01/2007	06/2007	50%	02/2009

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
3.2.6	Spoke prototype ready	October 2007	Done	May 2008
	Elliptical cavities, test of couplers	December 2008	Rescoped, on time	
	Spoke cavity- test of prototype	December 2008	On time	
	CH resonator- measurements	December 2008	Delayed	February 2009
	Comparative assessment of SC structure	December 2008	On time	

JRA3.4 Work Package 4: Beam Chopping

JRA3.4.1 CERN Activities

1. Chopper structure (subtask 4.1.4): Both assemblies are ready since the end of 2007.
2. **Chopper driver (subtask 4.1.3):** Tests on the first amplifier with positive output have been completed with a long term run (2 weeks, 24 hours per day). The amplifier generated bursts of 1000 pulses, 300 ns length with a repetition frequency of 1 MHz. The burst repetition frequency was 50 Hz. The amplifier behaved reliably during the whole test giving positive indications about the reliability of the Fast Ionization Dynistors.

The second pulse amplifier produced by FID technology was delivered to CERN in the second half of October 2007 and was the object of a partial measurement campaign. Measurements were stopped by a device failure that required returning it to the manufacturer for repair. As compared to the first amplifier some important improvements have been achieved even if the specifications are not fulfilled yet.
The **rise time** and the **pulse distortion** are now stable, practically independent from the pulse position within the burst and the specifications can be considered as achieved at least up to the working frequency of 10 MHz. The **minimum pulse length** is now the sum of a rising and a falling front thus well below the specified 8 ns. The **propagation delay time** can now be considered as stable for working frequencies up to 1 MHz while at 10 MHz it does not meet the specifications. The **fall time** is similar for this generator version as for the previous one. The values are 2.6 ns for the 90%-10% transitions and 3 ns for the 90%-3% and cannot be accepted for the chopper operation. Also unacceptable is the presence of an oscillation after the falling edge. Its amplitude reaching about 10% of the full signal would perturb some bunches after each transition.
Operation at 1 MHz and 10 MHz with 1 ms burst and 50 Hz burst repetition frequency was tested during about 1 hour. When the driving signal was set to 20 MHz, 10 ns pulse length, 1 ms burst and 50 Hz burst repetition frequency, the generator broke-down after few seconds.
A third amplifier, replacing the first positive output unit, was delivered in March 2008. It is supposed to implement all the improvements achieved in the negative output unit. Unfortunately a breakdown in the power stage happened shortly after the beginning of tests while switching off the device.
For both failures, discussions with the manufacturer suggest that the triggering procedure used at Cern is not correct as it can drive the pulse amplifiers in unsafe situations. If this true the internal pulse amplifier drivers and interlocks have to be improved to achieve reliable operation.
The low level timing electronics activity also continued with the design and manufacture of a fast synchronization circuit. The core of the system is composed of a synchronism detector, a fast adjustable delay and some digital circuitry that locks the rising front of a pulse returning from the pulse amplifier, to that of a reference pulse and compensates possible slow delay variations as shown in Fig. JRA3.4.1.

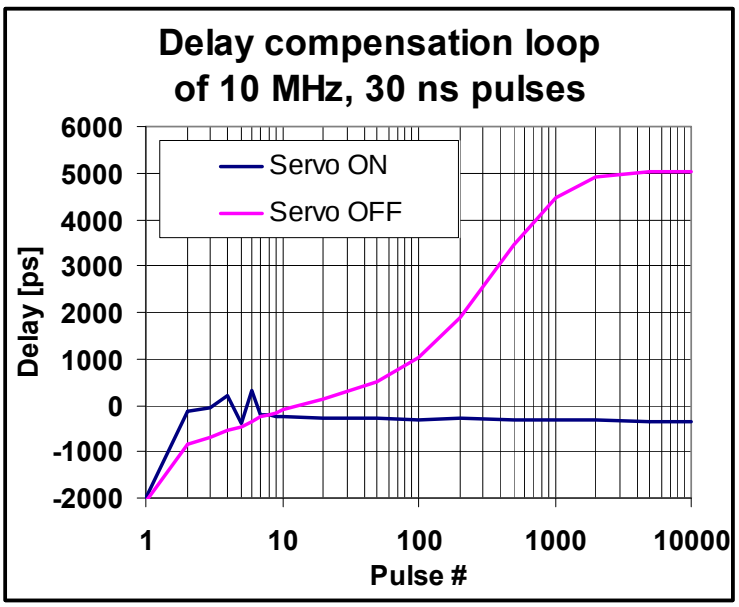


Figure JRA3.4.1: Delay compensation loop of 10 MHz 30 ns pulses

The use of the chopper as a longitudinal-transverse emittance exchanger has been numerically verified under different beam conditions. Such a concept, which is outside the HIPPI scope, can be another application of the meander line chopper structure. The outcome of this calculation has been summarized in a CARE note (CARE-Note-2008-002-HIPPI)

Chopper line:

In the second half of 2008, has been completed the assembly of the chopper line. All the elements have been installed and the line is under vacuum. In particular, concerning the HIPPI activities, the two choppers and the dump have been installed. A picture of the transfer line can be seen in Fig JRA3.4.2.

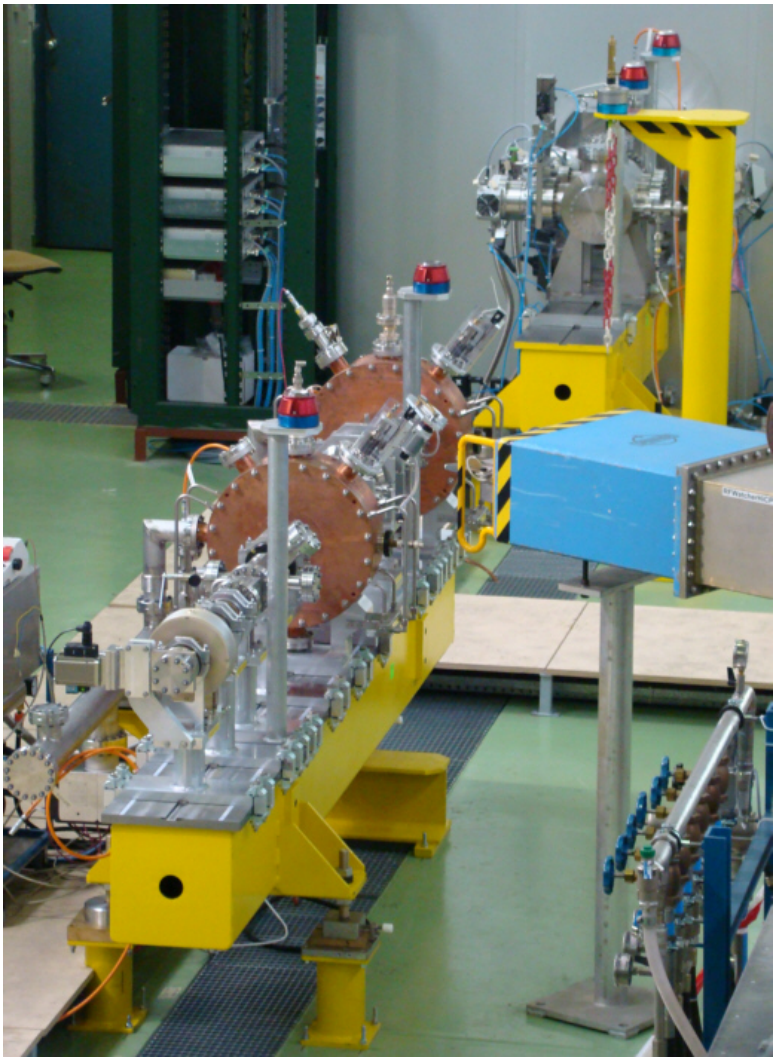


Figure JRA3.4.2: The CERN 3 MeV test stand line. In the background the H- source and LEBT assembly in progress; in the foreground the chopper line assembled and under vacuum.

JRA3.4.2 STFC-RAL Activities

Fast chopper electrodes - slow-wave structures

Preliminary engineering designs for the planar and helical electrodes have been refined. The engineering drawings for test assembly 01 have been completed and arrangements have been made to manufacture the assembly on-site, in RAL's Millimetre - Wave Technology (MMT) development facility. The three initial precision assemblies will serve as 'test beds' for the materials and design concepts to be employed in the subsequent quarter scale planar and helical electrode designs. Considerable effort has been expended on the selection and sourcing of suitable materials (e.g. copper and aluminium alloys, and machine-able ceramics), and of specialised RF components (e.g. large diameter semi-rigid coaxial cable from Microstock Inc, USA, and miniature L-C trimming elements from Temex Ceramics, France). In addition, effort was expended on the identification of specialist services (e.g. precision machining and metallisation of ceramics, precision bending and terminating of large diameter semi-rigid coaxial cable, electro-plating, and electro-polishing).

The slow-wave electrode design activity is continuing. The latest slow wave structure is shown in Fig JRA3.4.3.

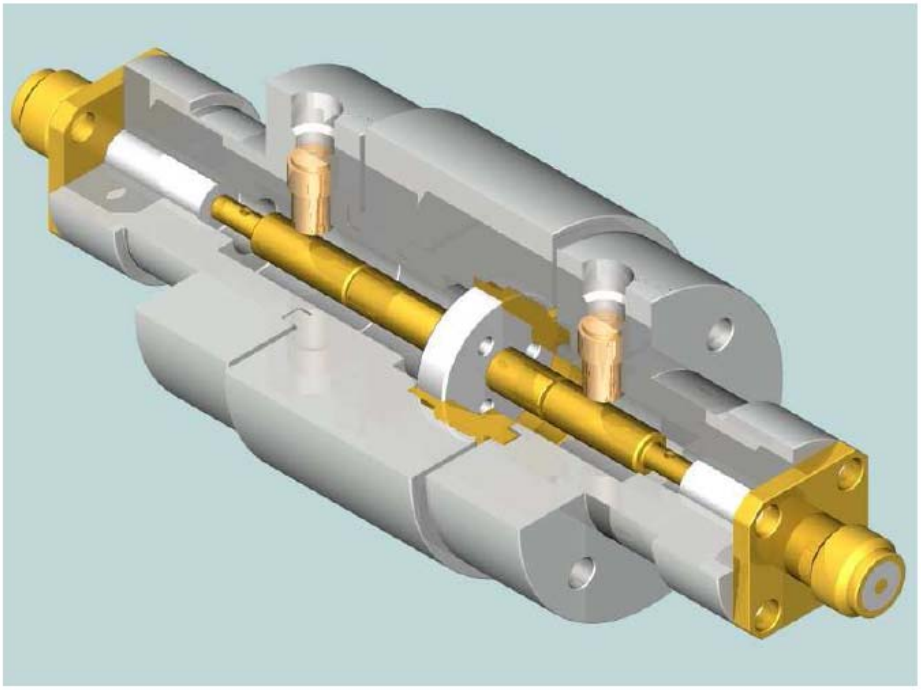


Figure JRA3.4.3: Slow wave structure

The design of three test assemblies has then been completed. An electro-polishing technique has been developed that enables a simultaneous 'fine tuning' of strip-line characteristic impedance, together with the formation of a controlled edge radius. The measured high frequency (HF) characteristics of the 'Coaxial' and 'Helical' assemblies are encouraging, and indicate that there is good agreement with the HF characteristics predicted by the 3D high frequency design code (CST Microwave Studio). These initial assemblies are regarded as 'test beds' for the materials and design concepts to be employed in the subsequent 'short length' planar and helical prototype electrode designs, and are providing important information on the following:

- Accuracy of the 3D high frequency design code.
- Construction techniques.
- NC machining and tolerances.
- Selection of machine-able ceramics and of copper and aluminium alloys.
- Electroplating and electro-polishing.

A manufacturer of high stability, vacuum compatible, and 'radiation hard', semi-rigid coaxial cable has been identified (Meggitt Safety Systems). The current RAL 'Helical' electrode design utilises a semi-rigid coaxial cable (UT390) with a solid PTFE dielectric, a polymer that is not 'radiation' hard. The replacement of these cables with 'Meggitt' SiO2 dielectric, hermetically sealed cables, is a strategy that promises to address this weakness in the current design.

RAL slow pulse generator (SPG)

A number of 2 uF @ 4 KVDC, oil filled capacitors have been purchased, with the intention of reducing the exponential pulse amplitude decrease seen during the burst duration. A scheme to provide active stabilisation of the high voltage power supply is being considered. Initial estimates indicate that fast active voltage stabilisation should reduce burst pulse amplitude droop by an order of magnitude. Upgrades to the SPG high voltage power supply, auxiliary power supplies, and to cooling, have been made during this period. Tests indicate that the 4 kV rated switch (Behlke model no. HTS 41-06-GSM-CF-HFB), when operated at the required FETS potential of 3 kV, is now generally compliant with the FETS SPG requirements. The new 'Scheme A' optical design for the FETS MEBT significantly lowers the SPG voltage requirement to ± 1.5 kV for a bipolar, or 3.0 kV for a unipolar SPG implementation. The results of the 4 kV SPG tests indicate that a unipolar implementation of the 'slow' chopper, may now be viewed as a practical possibility.

JRA3.4.3 Overall Progress of Work Package 4

Table 4.4a: Status of the Sub tasks in WP4 which are supposed to have started according to the MS project breakdown in Annex 1

WBS #	Title	Original begin date (Annex 1)	Original end date (annex1)	Estimated Status	Revised end date
4.1	Chopper structure A (CERN)				
4.1.7	Prototype testing w/o beam	January 2006	December 2007	finished	
4.2	Chopper Line				
4.2.3	Beam line assembling	June 2005	December 2007	Finished	
4.3	Chopper structure B (RAL)				
4.3.3	Prototype construction	January 2006	June2007	finished	May2008
4.3.4	Prototype testing	November 2007	June2008	finished	December 2008

Table 4.4b: Status with respect to the interim reports and deliverables due in 2007 according to the MS project breakdown

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
4.2.3	Chopper A beam line assembling.	December 2007	100%	December 2008
4.3.3	Chopper B Prototype ready	June 2007	delivered	June 2008
4.2.3	Beam line assembling	June 2005	100%	December 2008
	Comparative assessment of chopper design	December 2008	100%	December 2008

JRA3.5 Work Package 5: Beam Dynamics

Collaborative work on code benchmarking

Evaluations of UNILAC data on high intensity Ar^{10+} beam have been continued to understand discrepancies with the data of emittance measurements. Three codes have been used for the recent comparison campaign with institutional support: Dynamion (GSI), PARTRAN (CEA) and PARMILA (SNS). The code results on rms emittance growth as function of transverse phase advance were found in sufficiently good agreement. As the simulated emittance growth was generally found to be about 50% smaller than the measurements efforts have been made to understand the discrepancy. Partly better agreement could be achieved by improving matching for the experimental beam. On the simulation side it was found using DYNAMION that the original approach of using a truncated Gaussian distribution wasn't necessarily a good choice to match best with measured distribution. In particular distributions with more pronounced tails have been found to be a promising modification. Quantitative results and comparison with the particle-in-cell programs PARTRAN and DYNAMION are still in development.

Work at RAL on non-destructive ion beam diagnostics at the Front End Test Stand

For diagnostic non-destructive measurement devices provide minimum influence on the ion beam. In addition, for applications like High Power Proton Accelerators (HPPA) very often problems arise due to the power deposition on wires, pinhole or slit plates as used for different types of beam diagnostics. Therefore diagnostic devices without any mechanical part inside the ion beam would be a large improvement.

The work has been concentrating on building up a small laser lab to achieve the possibility of testing different ways of laser beam guiding. Sufficient spatial resolution means high demands particular with regard to laser beam alignment, i.e. a constant perpendicular angle between photons and H- ions over the whole scanning range. Varying the angle with the position leads to a lot of error handling afterwards or is impossible. Beside the alignment the transverse photon density distribution is important which makes it necessary to use a well-collimated, Gaussian shaped laser beam with TEM_{00} mode.

But unlike misalignment it is possible to consider the density distribution easier during emittance computation or simpler the collimation is good enough to neglect fringe effects. Therefore all the laser equipment will be tested with the new laser lab during the next time with the aim to proof various aspects of spatial resolution.

A recent aspects of work concerning the non destructive photo detachment diagnostics at RAL is the emittance reconstruction by moving the particle detector (which is in general used to determine the transverse angular momentum). This feature allows to measure beam profiles along a short drift length. Using a Baysian statistics method called Maximum Entropy (MaxEnt) a relatively low (3...10) number of profiles is sufficient to reconstruct the missing 2dim projected view achieving a good agreement with the entrance distribution. Further studies about the necessary phase advance were also performed.

Another aspect was investigated experimentally at the ion source development rig where the laser was "simulated" by a movable slit. After a drift this collimated beam was then mapped with a scintillator allowing to understand the same slit--point transformation of the PD emittance instrument. Some of the measured features might be helpful to optimise ion source and sector magnet.

JRA3.5.2 CEA Activities

Development of a code which allows to investigate plasma evolution coupled with the Maxwell equations dynamically. For space charge compensated LEBT line, numerical investigations which are in a good agreement with measurements showed how it is possible to reduce the emittance growth by playing with the nature and the partial pressure of the different gas in the vacuum pipe. We plan experiments in December with the SILHI LEBT to refine the code predictions.

Table 4.5a : Status of the Sub tasks in the WP which are supposed to have started according to the MS project breakdown in Annex 1

WBS #	Title	Original begin date (Annex 3)	Original end date (Annex 3)	Estimated Status	Revised end date
5.1	Code development				
5.1.1	Preparation, Dev. of 3D space charge routines, Testing	January 2004	June 2006	100%	December 2007
5.1.3	Neutralization and ECR source model.	January 2004	December 2005	100%	December 2008
5.1.6	Codes preparation for SC linacs	January 2004	December 2006	100%	June 2007
5.1.7	Code comparison and benchmarking	January 2005	September 2008	100%	
5.2.2,3	Measurement campaigns	June and Oct. 2006		100%	July 2007
5.3	Diagnostics and collimation				
5.3.4	Non-interceptive bunch measurement construction (GSI)	January 2005	December 2006	100%	April 2007
5.3.9	Halo monitor tests and improvement (CERN)	January 2004	June 2005	100 %	March 2007
5.3.7	Beam profile monitor design (FZJ)	January 2005	June 07	100%	
5.3.6	On-line transmission control (GSI)	October 2005	September 2007	100%	

Table 4.5b: Status with respect to the interim reports and deliverables due in 2008 according to the MS project breakdown

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
5.2.3	Code benchmarking	October 2008	delivered	
5.4	Simulations (and experiments)at CERN	December 2008	Report in preparation	
5.5	Comparative assessment	December 2008	On time	

JRA3.6 Significant Achievements

WP2:

- Successful testing of the DTL prototype at CERN, which has allowed validating the construction technology and the novel drift tube alignment system.
- Completion of the design of the PIMS accelerating structure, solving the remaining design issues and launching the construction of a full-scale prototype.
- Completion of the measurements on the CH model and of the design of the full-scale prototype.

WP3: Completion and vertical tests of Cavity B at CEA Saclay

- Completion of the spoke prototype at FZJ, treatments at CNRS Orsay and successful measurement.

WP4: Assembly of the chopper line at CERN

WP5: Benchmarking experiments completed at GSI, with improvements to the UNILAC machine.

JRA3.7 List of major meetings organized under HIPPI during the reporting period

The list of events concerning HIPPI during the year 2008 is shown in Table 1.1.1a. More details are given in Table 1.1.1b (web-site or address of the minutes).

Table 1.1.1a: Overview of meeting, workshop and event (co)organized by the Activity or with Activity contributions

	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CARE & HIPPI												
CSC Meeting				9 Paris					17-18 CERN			
WP2 Meeting						10-11 Grenoble						
WP3 Meeting												
WP4 Meeting						20 CERN						
WP5 Meeting					19 GSI							
HIPPI Annual Meeting										29-31 CERN		
CARE Meeting												2-5 CERN
Collaboration meetings												
LINAC4 Review	29-30 CERN		.									
ISTC CCDTL Meeting			10-13 CERN									
Conferences, workshops												
EPAC 2008						23-27 Genoa (I)						
HB2008								25-29 Nashville (TN, USA)				
LINAC 2008									28-3 Victoria (BC, Canada)			

Table 1.1.1b: List of meeting, workshop and event (co)organized by the Activity

Date	Title/subject	Location	Main organizer	Number of participants	Comments and Web site
29-30 January 2008	Linac4 Machine Review	Geneva (CH)	CERN	~50	https://linac4.web.cern.ch/linac4/CMWG.htm
19 May 2008	WP5 Meeting	Darmstadt (D)	GSI		
10-11 June 2008	WP2 Meeting	Grenoble (F)	LPSC	10	
20 June 2008	WP4 Meeting	Geneva (CH)	CERN		
29-31 October 2008	HIPPI Annual Meeting	Geneva (CH)	CERN	38	http://indico.cern.ch/conferenceDisplay.py?confId=39839

1.1.1 General meetings

The HIPPI Annual Meeting was organised CERN, at the AB Auditorium on the Meyrin (Switzerland) site. The programme included three presentations on the status of the local accelerator projects supported by HIPPI (Linac4 at CERN, FAIR Injector at GSI and various programmes at RAL), and for each of the Workpackages a 1.5 hour presentation session followed by a discussion session devoted to the preparation of the common assessments. A session on the status of the missing deliverables concluded the meeting. Presentations were available on the web site, to be used by the ESAC, about a week before the Meeting.

The Annual Meeting was attended by 38 participants, and with one exception (INFN Naples), all the HIPPI Laboratories were represented. A participant came from a Laboratory (GANIL, France) external to HIPPI but interested to the HIPPI developments. The three members of the External Scientific Advisory Committee were present. During the meeting, the debate, often stimulated by the ESAC, was passionate and in some cases the sessions continued well over their schedule. It was however possible to come to a general agreement on the structure, scope and schedule of the common assessments.

The transparencies of the presentations at the HIPPI Annual Meeting are available on the HIPPI08 web-site: http://indico.cern.ch/conferenceDisplay.py?confId=39839

In the HIPPI07 web-site: http://www.fz-juelich.de/ikp/hippi/autumn2007/

1.4.4 JRA4: Next European Dipole (NED)

The list of participants and of their implication in the NED Work Packages (**C**: Coordination, X: Participation) is given in the table bellow. The overall management is done by CEA and TEU.

Number	Participant	WP1 M&C	WP2 TSQP	WP3 CD	WP4 IDI	WG MDO[a)]	Person-months
1	**CEA**	**C**	X	X	X	X	6,27
10	**INFN**	X	**C**	X			0
	INFN-Ge	X		X			
	INFN-Mi	X	**C**	X			
11	**TEU**	X		X			0,96
15	**WUT**	X	X				4
16	**CSIC**	X				**C**	0
	CIEMAT	X				X	
17	**CERN**	X		**C**		X	9,60
20	**STFC**	X	X		**C**	X	0
	STFC-RAL	X	X		**C**	X	

JRA4.3 Work Package 3: Conductor Development (CD)

Introduction

For the NED project one work package, the conductor development was still active in 2008. The NED conductor development is carried out through two industrial contracts awarded to ShapeMetal Innovation (SMI) in the Netherlands, which has now been acquired by European Advanced Superconductors (EAS) in Germany and to Alstom/MSA. The two industrial contracts are coming to an end but both are taking more time to conclude than anticipated. SMI/EAS is currently manufacturing the final strand. 6.4 km of PIT strand have already been delivered and the remaining quantity is expected to be delivered to CERN by the end of 2008. The PIT conductor development is very successful as it attained all technical targets set by the NED stand specification. The firm Alstom/MSA has concentrated the effort in resolving workability issues to produce sub-elements of the desired geometry. The sub-elements have been manufactured following two roads either by cold working or by extrusion. Alstom/MSA was successful to manufacture a sub-element suitable for NED conductor by both processing roads. Alstom/MSA has launched the final production of the NED conductor following both roads. The Internal Tin development came a long way as it started from scratch but is still below the specification. This development is showing a slow but steady improvement and has the potential to eventually attain the required performance. A financial guarantee will allow the IT contract to continue and finish in the course of next year.

Activities

Conductor development: status of SMI

SMI completed the step 2 of the development program of the NED conductor mid 2007 with the successful cabling test of the NED cable with B215 strand. The cabling tests proved the suitability of the SMI-NED strand for cabling, a moderate degradation between 4% and 8% was measured on strands extracted from the cable after a heat treatment at 650 ^{o}C during

120 h. The go-ahead for final strand production was given to EAS/SMI in August 2007. The total strand production corresponding to 12.7 km of strand is done under the responsibility of EAS. The transfer of technology led to delay in the fabrication of the final PIT strand as the equipment of SMI had to be installed in the EAS's factory at Hanau. Final strand manufacturing is currently underway.

An optimization study was launched at CERN in order to improve strand performance by decreasing the heat treatment temperature down to 625 ^{o}C and duration between 84 h and 400 h. For samples from B215 strand reacted at 625 ^{o}C during 320 h, a critical current increase of ~ 10% as compared to the standard heat treatment of 84 h at 675 ^{o}C was measured with a record value of ~ 1500 A and an impressive non-copper critical current density of ~ 2700 A/mm^2 at 12 T and 4.2 K. At 15 T and 4.2 K, the critical current exceeds the NED specified value (818 A), corresponding to a critical current density of more than 1500 A/mm^2. The RRR data are as well very high, with values around 220. With the modified heat treatment, the PIT strand completely fulfils the NED stringent specification.

A first strand length of 1000 m, B228, produced partly at Hanau by EAS and partly at Enschede by SMI was delivered to CERN in April 2008 into two strand piece lengths of 400 m and 600 m. A second strand, B230 (1650 m), was completely produced at Hanau, except final strand drawing to nominal diameter. This strand was delivered to CERN in July 2008 into 4 strand piece lengths (705 m + 314 m + 305 m + 323 m). When reacted to 120 h at 650 ^{o}C, a critical current density of ~ 2500 A/mm^2 at 12 T and 4.2 K was obtained by EAS on the strand B230, very similar to the value obtained on strand B215 with the same heat treatment. Since July 2008, equipment transfer from SMI to EAS was completed. A third strand was delivered to CERN in October 2008 into 2 strand piece lengths (1440 m + 2357 m).
The remaining 6.3 km of PIT strand are currently in early steps of production at Hanau. They are expected to be delivered to CERN by the end of 2008.

Conductor development: status of Alstom/MSA

Alstom/MSA is developing the NED strand by the internal tin technology. The first and second steps of the conductor development program were devoted to the qualification of the sub-element ant to the development of the fabrication process to draw a Nb_3Sn strand with 246 sub-elements. During this part of the conductor development program, all the sub-elements produced by Alstom/MSA have used pure Nb filaments.

During the second step, Alstom/MSA has continued the development following two different roads to fabricate the sub-element by cold drawing and by hot extrusion. The sub-element billet extruded in April 2007 was used in December 2007 for the stacking of two final stage billets with 78 and 246 sub-elements, called respectively B1/20124 and B1/63468. The two billets were drawn to final diameter with only few breakages which has allowed to get few very long piece lengths of 826 m and 402 m for the billet B1/20124 and 1308 m for the billet B1/63468. The modification implemented by Alstom/MSA in the manufacturing process were very successful in term of workability which was the main problem encountered by Alstom MSA since the beginning of the program. The strand drawn at 1.25 mm diameter from the billet B1/63468 achieved only a critical current of 864 A at 4.2 K and 12 T corresponding to a non-copper critical current density of ~ 1500 A/mm^2. Few different types of heat treatments were tried without success by CERN to improve the critical current density. The critical current was measured at the Geneva University as function of longitudinal strain up to 0.35% tensile strain to check the stress impact but the maximum critical current density reached did not exceed 1590 A/mm^2 at 4.2 K and 12 T. Scanning Electron Microscopy analysis was also performed at CERN to find an explanation for the low values of the critical current density. The examinations have shown the presence of big Nb_3Sn grains (average diameter around 500 nm) covering 50% of the Nb_3Sn area. The main reason for this low Sn content seems to be the presence of the big Nb_3Sn grains though the Sn content between 24.3 at %and 25.7 at % Sn could be slightly too high for a binary Nb_3Sn alloy. Solutions using Ta additions, which should limit grain growth, are being implemented by Alstom to overcome the limitation of binary Nb_3Sn alloy and to achieve the final strand production. Alstom is launching in production two sub-element billets that will be extruded in December 2008. The completion of the drawing expected for April 2009 should lead to the fabrication of 20 km of strand.
In parallel with the development of the NED strand following the road 2, Alstom continue the development of the sub-elements by cold drawing. Two sub-element billets were launched in fabrication in July 2008 with NbTa filaments and with the same design as for the sub-element used in the fabrication of the billet having reach 1930 A/mm2 at 12 T and 4.2 K at the beginning of step 2. The drawing of the two sub-elements to the re-stacking diameter was very successful demonstrating that the actions taken by Alstom/MSA to improve the workability have been relevant. In addition three sub-elements billets with the same design have been launched in fabrication in September 2008 for the production of the final strand. Six kilometres of strand are expected to be produced with the material launched in production following the road 1.

Achievements

The two Nb_3Sn strand manufactures contracted by CERN to develop NED conductors are being producing the strand for the final strand delivery. SMI/EAS delivered to CERN 6.4 km of strand over a total quantity of 12.7 km. The remaining part of the final delivery is produced by EAS and shall be delivered to CERN by end of February 2009. With a modified heat treatment, s critical current density in the non-copper part of more than 1500 A/mm^2 at 15 T and 4.2 K was obtained on the PIT strand, which has reached the specification target.

Alstom/MSA has continued its effort to develop the NED strand and significant progress has been made in terms of workability. The main result so far has been the production by Alstom/MSA of a billet including 246 sub-elements of 50 μm with only 3 breakages.

Conductor review

In November 2008 the NED External Scientific Advisory Committee convened to review the NED conductor development program. Presentations were given on the topics in the conductor work package and on conductor stability, mechanical stress sensitivity and conductor needs for future accelerator dipole and quadrupole magnets. The NED-ESAC formulated four general conclusions:

- *"It is clear that the goals and high-level conductor performance targets set at the beginning of the program five years ago were the correct ones: a high $J_c \geq 1500$ A/mm^2 at 15 T and 4.2 K, a small effective filament diameter ≤50 μm, a Cu : non-Cu ratio of 1.25, a strand diameter of 1.25 mm, and high copper residual resistivity ratio (RRR) ≥ 200, and wire which can be formed into cable with only modest degradation."*
- *"The program has been successful in developing two European vendors for advanced Nb_3Sn conductor suitable for high-energy accelerator magnets. One vendor (SMI-EAS) has delivered a substantial quantity of wire which meets the targets, roughly doubling the J_c relative to the performance before this program. The remaining quantity on order is to be delivered by the end of the year. A second vendor (Alstom), who had no recent experience with Nb_3Sn technology, has made good progress, but has not yet delivered a substantial amount of conductor, and the wire delivered doe not yet meet the targets. Specific recommendations are given below for how the remainder of the contracts with SMI-EAS and Alstom can best be used to advance their capabilities and advance the understanding of high- performance Nb_3Sn for use in accelerator magnets.*
- *"In the judgment of the Committee, A-15 superconductors and specifically Nb_3Sn continue to represent the best path towards higher field magnets for high-energy accelerators, and they will remain so for the foreseeable future. Thus, vigorous development of Nb_3Sn technology, including the manufacturing of superconducting wire and cable and the design and construction of accelerator-type magnets made from this conductor, needs to continue."*
- *"Given the world-record performance of the Powder-in-Tube type of Nb3Sn conductor especially developed for this NED program, the committee concludes that the FP6-CARE-NED program was successful and rightly targeted. It has given the European collaborators a feasible conductor technology suitable for 15T class high-field accelerator magnets, provided the research is continued and the conductor is used in demonstration magnets. The new FP7- EuCARD-HFM program will be an important part of the world-wide effort, and, building on NED experience, will position Europe as one of the leaders in advanced superconductor development."*

In addition the committee made a number of detailed technical recommendation for the two production roads Power-in-Tube and Internal-Tin.

For future programs for Nb3Sn conductor development the Committee made several recommendations on eg: the filament diameter, wire diameter, stability issues, strain sensitivity, commercial strategy with the industry, collaboration between European and non-European laboratories.

2. List of Deliverables

2004

Activity	Deliverable N°	Deliverable Name	Deliverable Type	Workpackage/ Task N°	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
ELAN	1	ELAN web site	Web site	All WPs	CNRS-Orsay	4	4
ELAN	2	Beam Dynamics code repository site functional	Data base	WP3	CERN	12	12
ELAN	3	Instrumentation web site	Web site	WP4	STFC, UMA	6	21
ELAN	4	Instrumentation data base	Data base	WP4	STFC, UMA	12	23
BENE	5	BENE web site	Web site	All WPs	INFN-Na	4	4
BENE	6	Annual report of the BENE network	Report	All WPs	INFN-Na	12	12
BENE	7	Proposal for FP6 Design Study of a new neutrino facility	Report	All WPs	INFN-Na	12	delayed to FP7
BENE	8	Proceedings of Multi-MW workshop	Report	All WPs	INFN-Na	12	14
BENE	9	BENE Physics web site	Web site	WP1	INFN-Pa, CERN	3	3
HHH	10	HHH web site	Web site	All WPs	CERN	12	9
HHH	11	APD web site	Web site	WP3	CERN	6	9
SRF	12	Final report on reliability issues	Report	WP2	DESY	9	30
SRF	13	EP on samples: best EP parameters	Report	WP5	CEA	12	26
NED	14	Final report on wire and cable specifications	Report	WP3	CERN	6	6
NED	15	Design report on 15 T dipole magnet	Report	WP3	CERN	12	13

2005

Activity	Deliverable N°	Deliverable Name	Deliverable Type	Workpackage/ Task N°	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
ELAN	1	Work plan and documentation data base	Data base	WP1	CERN	24	22
ELAN	2	Data base on SRF documents	Data base	WP2	DESY	24	24
BENE	3	18-month interim report	Report	All WPs	INFN-Na	23	23
BENE	4	Annual report of the BENE network	Report	All WPs	INFN-Na	24	24
BENE	5	Proceedings of NuFact'05 workshop	Report	All WPs	INFN-Na	24	30
BENE	6	Launch of scoping study of a new neutrino facility	Web site Report	All WPs	INFN-Na	18	18
HHH	7	Beam Dynamics code repository	Data base	WP3	CERN	24	18
SRF	8	EP on multi-cells: parameters fixed	Report	WP5	DESY	13	37
SRF	9	Automated EP is defined	Report	WP5	INFN-Legnaro	21	37
SRF	10	Dry ice cleaning: parameters fixed	Report	WP5	DESY	18	37
SRF	11	CEA tuner: start of integrated experiments	Prototype	WP8	CEA	15	24
SRF	12	Report on IN2P3 tuner activities	Report	WP8	CNRS-Orsay	24	39
SRF	13	Report on data management developments	Report	WP9	DESY	21	24
SRF	14	Report on RF gun control tests	Report	WP9	DESY	23	37
PHIN	15	High efficiency photocathode comparison	Report	WP2	FZR	24	24
PHIN	16	High power laser oscillator	Report	WP3	STFC-RAL	13	13

PHIN	17	Amplifier construction	Prototype	WP3	CERN, INFN	19	54
PHIN	18	Oscillator + amplifier test	Report	WP3	STFC-RAL	23	30
PHIN	19	Pulse shaping system: phase mask acquisition and test	Report	WP3	INFN-Milano	16	23
PHIN	20	Pulse shaping system: Dazzler acquisition and test	Report	WP3	INFN-LNF	17	41
PHIN	21	Pulse shaping comparison	Prototype	WP3	INFN-LNF, INFN-Milano	22	47
PHIN	22	UV harmonic generator test	Prototype	WP3	CERN, CEA	16	54
PHIN	23	Laser RF feedback development	Report	WP3	CERN	21	59
PHIN	24	Two 3 GHz RF guns construction	Prototype	WP4	CNRS-Orsay	18	54
PHIN	25	1-50 MeV spectrometer construction	Prototype	WP4	CNRS-LOA	24	36
HIPPI	26	Halo measurement device design and construction	Report	WP5	CERN	18	24
NED	27	Commissioning of heat transfer facility	Prototype	WP2	CEA, WUT	16	35
NED	28	Final report on Quench Protection	Report	WP2	INFN-Milano	18	23
NED	29	Report on conventional insulation	Report	WP4	STFC-RAL	24	40
NED	30	Report on innovative insulation	Report	WP4	CEA	18	48

2006

Activity	Deliverable N°	Deliverable Name	Deliverable Type	Workpackage/ Task N°	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
ELAN	1	Data base on diagnostics performance	Data base	WP4	STFC, UMA	36	36
BENE	2	Annual report of the BENE network	Report	All WPs	INFN-Na	36	38
BENE	3	Proposal for design studies and R&D	Report	All WPs	INFN-Na, CCLRC	36	31
BENE	4	Summary of NuFact'06 workshop Strategy document	Web site Report	All WPs	INFN-Na	36	32
HHH	5	Data base on SC magnets and cables	Data base	WP1	CERN	36	48
SRF	6	Evaluation of spinning parameters	Report	WP3	INFN-Legnaro	29	37
SRF	7	1-cell spinning parameters defined	Report	WP3	INFN-Legnaro	36	57
SRF	8	Report on new LLRF hardware components	Report	WP9	DESY	26	37
SRF	9	New BPM ready for installation	Prototype	WP11	CEA	25	34
SRF	10	Evaluation of HOM-BPM operation	Report	WP11	CEA	36	37
PHIN	11	Photocathode ready for 3 GHz RF guns	Prototype	WP2	CERN	25	41
PHIN	12	UV generation and feedback: overall system assembly and tests	Prototype	WP3	CERN	30	58
PHIN	13	SC RF gun realisation	Prototype	WP4	FZR	26	36
PHIN	14	SC RF gun test	Report Report	WP4	FZR	36	part 1: 39 final : 59

PHIN	15	CTF3 3 GHz RF gun test at CERN	Report	WP4	CNRS-Orsay, CERN	33	60
HIPPI	16	H-mode DTL prototype ready	Prototype	WP2	IAP-FU	36	54
HIPPI	17	CCDTL prototype tested	Report	WP2	CERN	36	47
HIPPI	18	Elliptical cavities: cavity B ready	Prototype	WP3	CEA	30	41
HIPPI	19	Chopping structure A: prototype ready	Prototype	WP4	CERN	32	36
HIPPI	20	Beam Dynamics: simulations and experiments at UNILAC	Report	WP5	GSI	36	46
HIPPI	21	Profile measurements by fluorescence	Report	WP5	GSI	31	38
HIPPI	22	Non interceptive bunch measurement	Report	WP5	GSI	36	42
HIPPI	23	Collimators design	Report	WP5	CERN	36	30
NED	24	Final Report on Heat Transfer Measurements	Report	WP2	CEA	36	47
NED	25	Final wire production	Prototype Report	WP3	CERN	30	60
NED	26	Final report on wire characterization	Prototype Report	WP3	CERN	30	60
NED	27	Final cable production	Prototype	WP3	CERN	36	60
NED	28	Final report on cable performances	Report	WP3	CERN	36	60

2007

Activity	Deliverable N°	Deliverable Name	Deliverable Type	Workpackage/ Task N°	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
ELAN	1	Data base on laser plasma acceleration	Data base	WP5	CRNS-LPGP	48	cancelled
BENE	2	Annual report of the BENE network	Report	All WPs	INFN-Na	48	48
BENE	3	Proposal for design studies and R&D	Report	All WPs	INFN-Na	48	48
BENE	4	Proceedings of NuFact'07 workshop	Web site Report	All WPs	INFN-Na	48	60
SRF	5	Fabrication of new cavity with improved components	Prototype	WP2	INFN	47	59
SRF	6	EB Welding of prototype components	Prototype	WP2	DESY	48	57
SRF	7	Fabrication Multi-cell cavities by spinning	Prototype	WP3	INFN-Legnaro	48	60
SRF	8	Fabrication of hydroformed 9-cell cavities	Prototype	WP3	DESY	47	60
SRF	9	First multicell coating with linear-arc cathode	Prototype	WP4	IPJ	48	60
SRF	10	First multicell coating with planar-arc cathode	Prototype	WP4	INFN-Roma2	41	60
SRF	11	Report on quality of HTc superconducting properties	Report	WP4	INFN-Roma2	48	59
SRF	12	EP on single cells: parameters fixed	Report	WP5	CEA	48	57
SRF	13	Evaluate oxipolishing experiments	Report	WP5	DESY	40	60
SRF	14	Final report on industrial electropolishing	Report	WP5	DESY	48	59

SRF	15	Automated EP: Conclude on best electrolyte	Report	WP5	INFN-Legnaro	44	59
SRF	16	VT cleaning of 9-cell cavities: evaluation of experimental results	Report	WP5	DESY	48	60
SRF	17	Dry ice cleaning of horizontal 9-cell cavities: evaluation of experimental results	Report	WP5	DESY	48	60
SRF	18	Final report on SQUID scanning	Report	WP6	DESY	48	57
SRF	19	Conclude on comparison of SQUID scanner vs. flux gate detector	Report	WP6	INFN-Legnaro	48	59
SRF	20	DC field emission: evaluation of scanning results	Report	WP6	DESY	48	51
SRF	21	DC field emission: evaluate strong emitter investigations	Report	WP6	DESY	48	51
SRF	22	Prototype couplers: final report on conditioning	Report	WP7	CNRS-Orsay	47	59
SRF	23	Evaluation of INFN tuner operation	Report	WP8	INFN-Mi	48	51
SRF	24	Cryostat integration tests: final evaluation	Report	WP10	CEA	46	60
SRF	25	Evaluation of BPM operation	Report	WP11	CEA	48	48
SRF	26	Evaluation of beam emittance monitor operation	Report	WP11	INFN-Ro	48	59
PHIN	27	Superconducting cavity photocathode tests	Report	WP2	FZR	37	59
PHIN	28	Final report on 100 MeV laser driven plasma source R&D	Report	WP2	CNRS-LOA	48	47
PHIN	29	NEPAL 3 GHz RF gun test at Orsay	Report	WP4	CNRS-Orsay	37	59

PHIN	30	50 MeV (low energy) spectrometer test	Report	WP4	CNRS-LOA	42	36
PHIN	31	1 GeV spectrometer development	Report	WP4	CNRS-LOA	48	47
HIPPI	32	Drift Tube Linac: development of critical components	Report	WP2	CNRS-LPSC	37	46
HIPPI	33	Side Couple Linac: RF cold model prototype test	Report	WP2	CNRS-LPSC, CERN	48	52
HIPPI	34	Elliptical cavities: test stand ready	Test stand	WP3	CEA	39	47
HIPPI	35	Spoke cavities: prototype ready	Prototype	WP3	FZJ, CNRS-Orsay	46	54
HIPPI	36	Chopper structure A: prototype testing (w/o and with beam)	Report	WP4	CERN	44	57
HIPPI	37	Chopper line: Beam line assembly and measurements	Report	WP4	CERN	48	60
HIPPI	38	Chopper structure B: prototype ready	Prototype	WP4	STFC-RAL	42	54
HIPPI	39	Diagnostics and collimation: online transmission control	Report	WP5	GSI	46	52
HIPPI	40	Diagnostics and collimation: beam profile monitor for high intensity	Report	WP5	FZJ	42	46

2008

Activity	Deliverable N°	Deliverable Name	Deliverable Type	Workpackage/ Task N°	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
ELAN	1	Final report of the ELAN network	Report	All WPs	CNRS-Orsay	60	60
BENE	2	Final report of the BENE network	Report	All WPs	INFN-Na	60	60
BENE	3	Proposal for design studies and R&D	Report	All WPs	INFN-Na	60	60
BENE	4	Proceedings of NuFact'08 workshop	e-Proceedings	All WPs	INFN-Na	60	60
HHH	5	Final report of the HHH network	Report	All WPs	CERN	60	60
HIPPI	6	Drift Tube Linac: Optimised design	Report	WP2	CNRS-LPSC, CEA, CERN	60	60
HIPPI	7	H-mode Drift Tube Linac: design finished	Report	WP2	IAP-FU	60	60
HIPPI	8	Cell Coupled Drift Tube Linac: design finished	Report	WP2	CERN	54	56
HIPPI	9	Comparative assessment of Normal Conducting structures	Report	WP2	CNRS-LPSC, CEA, CERN, IAP-FU	60	60
HIPPI	10	Elliptical cavities: high power pulsed tests cavity A and B	Report	WP3	CEA, INFN-Mi	60	60
HIPPI	11	Spoke cavities: testing of prototype	Report	WP3	FZJ, CNRS-Orsay	60	60
HIPPI	12	CH resonator: measurements	Report	WP3	IAP-FU	60	60
HIPPI	13	Comparative assessment of superconducting structures	Report	WP3	CEA, INFN-Mi, FZJ, IAP-FU, CNRS-Orsay	60	60

HIPPI	14	Chopper structure B: prototype testing	Report	WP4	STFC-RAL	54	54
HIPPI	15	Comparative assessment of chopper designs	Report	WP4	CERN, STFC-RAL	58	60
HIPPI	16	Beam Dynamics: code benchmarking	Report	WP5	GSI et al.	58	58
HIPPI	17	Simulations and experiment at CERN	Report	WP5	CERN	60	60
HIPPI	18	Comparative assessment of dynamics and measurements	Report Report	WP5	GSI et al.	60	60

3. Use and dissemination of knowledge

The CARE dissemination board includes the seven activity deputy coordinators and is chaired by the CARE deputy coordinator. The dissemination of knowledge activity focused on the publication of scientific articles presenting work partially funded by the CARE activity, on establishing Web sites and on promoting the CARE results at accelerator conferences.

3.1 Web Sites

The central CARE Web site http://care.lal.in2p3.fr , has been regularly updated. It includes:

- Links to the seven activity (NA and JRA) Web sites
- CARE official documents (Consortium agreement, Annex I, etc…)
- The table of CARE deliverables
- The CARE management network and directory
- The calendar of CARE meetings
- A link to the Publication repository
- Advertisements for vacant CARE funded temporary positions.

All seven activity Web sites are active and regularly updated by the corresponding activity management. Most of these Web sites provide access to informative Work Package Web pages.

3.2 Publications

The six categories of CARE publications are defined by the following table:

Publication category	Type of publication and Responsibility	Reviewing	Storage and numbering
CARE/Activ Document-year-number	Technical documents Responsibility of the authors	No review	Stored locally in NA/JRA web sites Numbering by NA/JRA coordinators
CARE-Pub-year-number	Journal publications CARE responsibility	Internal review	Stored in CARE web site Central numbering
CARE-Report-year-number	Yearly reports, and final deliverables to EC CARE responsibility	Submitted to EU commission	Stored in CARE web site Central numbering
CARE-Conf-year-number-Activ	Conference proceedings NA/JRA responsibility	Abstract approved by NA/JRA coordinators Internal review	Stored in CARE web site Central numbering
CARE-Note-year-number-Activ	CARE workshops and reviewed papers not aimed at publication CARE responsibility	Internal review	Stored in CARE web site Central numbering
CARE-Thesis-year-number-Activ	PhD thesis partly funed by CARE CARE responsibility	Internal review	Stored in CARE web site Central numbering

Publication Web Repository

All CARE papers belonging to the last five categories are stored and are publicly available on Web-based publication repository http://irfu.cea.fr/Documentation/Care/index.php. This Web repository is linked to the central CARE Web site from a new Web page http://care.lal.in2p3.fr/Publications which includes the requested acknowledgement to the EC support, as follows:

We acknowledge the support of the European Community-Research Infrastructure Activity under the FP6 "Structuring the European Research Area" programme (CARE, contract number RII3-CT-2003-506395).

The following table records the number of CARE scientific articles issued by the different activities (NA and JRA) in each category over the 5 year duration of the project.

2004 CARE Publications

	Publications	Conferences	Notes	Reports	Thesis
ELAN			26	1	
BENE		1	5		
HHH		8		1	
SRF	1	18	6	1	
PHIN	2	6	2	1	
HIPPI	1	19		1	
NED		2		2	
ALL				1	
TOTAL	**4**	**54**	**39**	**8**	

2005 CARE Publications

	Publications	Conferences	Notes	Reports	Thesis
ELAN		2	12	3	
BENE				4	
HHH	1	8	2	3	
SRF	13	26	6	3	
PHIN	5	5	1	6	2
HIPPI	1	14	7	4	
NED	5	2		4	
ALL	1	1		1	
TOTAL	**26**	**58**	**28**	**28**	**2**

2006 CARE Publications

	Publications	Conférences	Notes	Reports	Thesis
ELAN		2	11	2	
BENE	3			5	
HHH	3	24	3	2	1
SRF	10	35	4	10	5
PHIN	10	8	1	5	
HIPPI		19	13	5	
NED	6	3		5	1
ALL				1	
TOTAL	**32**	**91**	**32**	**35**	**7**

2007 CARE Publications

	Publications	Conférences	Notes	Reports	Thesis
ELAN			6	1	
BENE	5	3		2	
HHH	3	12	5	2	1
SRF	5	10	3	8	3
PHIN	2	5		8	1
HIPPI	1	7	5	9	
NED	3	3		3	
ALL				1	
TOTAL	**19**	**40**	**19**	**34**	**5**

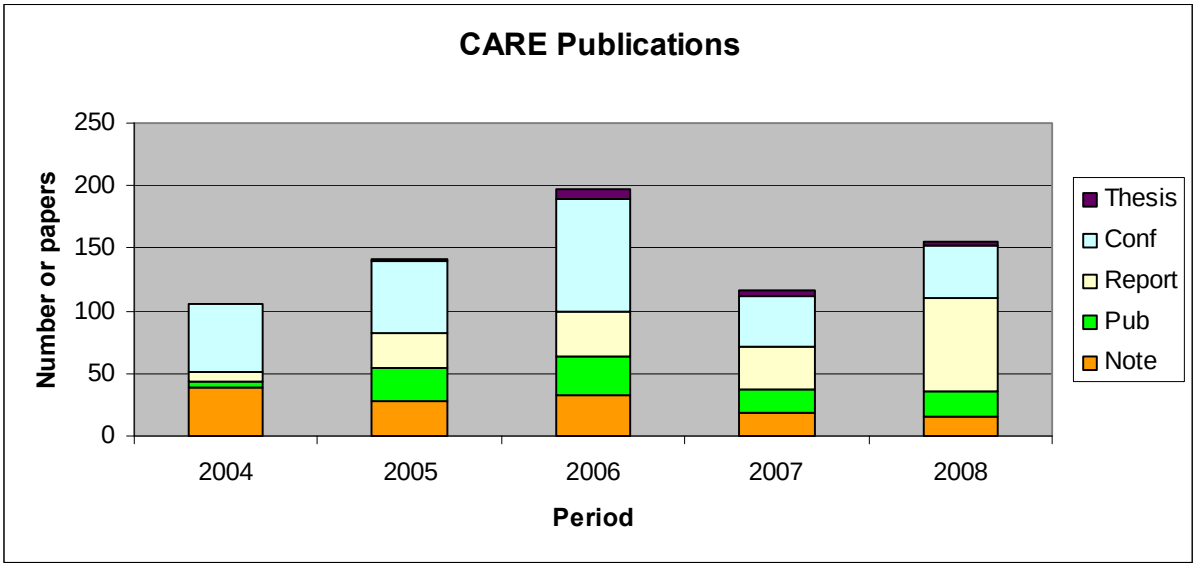
2008 CARE Publications

	Publications	Conférences	Notes	Reports	Thesis
ELAN			5	3	
BENE	9			3	
HHH	2	18	5	3	2
SRF	1	2		22	2
PHIN	6	6	1	10	
HIPPI	1	16	4	25	
NED	2			6	
ALL				2	
TOTAL	**21**	**42**	**15**	**74**	**4**

2004-2008 CARE Publications

	Publications	Conférences	Notes	Reports	Thesis
ELAN		4	60	10	
BENE	17	4	5	14	
HHH	9	70	15	11	4
SRF	30	91	19	44	10
PHIN	25	30	5	30	3
HIPPI	4	75	29	44	
NED	16	10		20	1
ALL	1	1		6	
TOTAL	**102**	**285**	**133**	**179**	**18**

The evolution of the number of publications over the 5 years of CARE activities is shown in the histogram below:



Publication lists for 2008:

The list of CARE papers can be directly uploaded from the following Web pages:

- CARE Journal Publications:
  http://irfu.cea.fr/Documentation/Care/care-pub-index-2008.php
- CARE Reports:
  http://irfu.cea.fr/Documentation/Care/care-rapport-index-2008.php
- CARE Conference Proceedings:
  http://irfu.cea.fr/Documentation/Care/care-conf-index-2008.php
- CARE Notes:
  - ELAN: http://irfu.cea.fr/Documentation/Care/care-note-elan-index-2007.php
  - HHH: http://irfu.cea.fr/Documentation/Care/care-note-hhh-index-2007.php
  - SRF: http://irfu.cea.fr/Documentation/Care/care-note-srf-index-2007.php
  - HIPPI: http://irfu.cea.fr/Documentation/Care/care-note-hippi-index-2007.php
  - NED: http://irfu.cea.fr/Documentation/Care/care-note-ned-index-2007.php

Annexes

Annex 1 – Summaries and main conclusions of the General Meeting

The CARE general meeting, CARE'08, took place at CERN Geneva, (Switzerland) on December 2-4, 2008.
The meeting Web site http://care08.web.cern.ch/care08 provides the information concerning the participation (113 participants), the scientific program and the presentations. An overview of the program is given on the next page.
The general meeting included one day of plenary session devoted to 15 highlight talks invited by the seven CARE activities to report on the most significant developments in their field of research. It also included one day of parallel of sessions dedicated to the CARE activity workshops and internal meetings to prepare for their annual report.
An important part of the program was the plenary session on December 3rd dedicated to the summary talks of the seven CARE activity coordinators. They all reported on the continued commitment of the institutes and their scientists towards the CARE programme and the objectives of the CARE activities. They also reported on the impressive amount of scientific and technical work already accomplished. Significant results have already been obtained, outlined elsewhere in this document, and no significant delays or difficulties appeared in their respective programme. In general, the progress of the fourth year of the CARE project has been quite satisfactory.

The CARE'08 general meeting was followed on December 5 by the Kick-off Meeting of the FP7 EuCARD Integrating Activity project which, in essence, will continue the accelerator R&D programs.

	Tuesday, December 2		Wednesday, December 3		Thursday, December 4
08:00	*Registration (Hall "pas perdus" near the Council Room)*				
09:00	PLENARY (Council Room)	09:00	PLENARY (Council Room)	09:00	PLENARY (Council Room)
Council Room	Introduction session Chair: J.-P. Koutchouk	Council Room	Highlight Talks Chair: G. Guignard	Council Room	JRA Summary Reports Chair: R. Aleksan
09:00	Welcome - From the Lab. Directorate hosting the general CARE meeting, J. Engelen (10mn)	09:00	HT-7 : Coupler conditioning, H. Jenhani, IN2P3/LAL, (18'+2')	09:00	Summary Report on SRF Activities D.Proch DESY (45+5mn)
09:10	CARE General CARE Status - by CARE coordinator, R.Aleksan CEA/IN2P3 (20'+5')	09:20	HT-8: Achievements in low level RF control, S. Simrock, DESY, (18'+2')	09:50	Summary Report on PHIN Activities A. Ghigo INFN (30+5mn)
09:35	CARE Dissemination Activities by Dissemination Board Chair. O. Napoly, CEA (20'+5')	09:40	HT-9 : Development of the accelerating structures for Linac4, F. Gerigk, CERN (18'+2')		
		10:00	HT-10 : Superconducting Cavity activities within HIPPI, J. Plouin, CEA, (18'+2')		
10:00	*Coffee Break*	10:20		10:25	*Coffee Break*
10:30	PLENARY (Council Room)	10:50	PLENARY (Council Room)	10:50	PLENARY (Council Room)
Council Room	Highlight Talks Chair: O. Napoly	Council Room	Highlight Talks Chair: F. Zimmermann	Council Room	JRA Summary Reports Chair: R. Aleksan
10:30	HT-1 : Electro-polishing: Industrialization and Ionic liquid as replacement of hazard acid, D. Proch DESY and E. Palmieri INFN-LNL, (26'+4')	10:50	HT-11 : Crystal collimation update, W. Scandale, CERN, (18'+2')	10:50	Summary Report of HIPPI Activities M. Vretenar CERN (30+5mn)
11:00	HT-2 : CTF3 photoinjector , K. Elsener, CERN, (18'+2')	11:10	HT12: Validation of the MERIT MMW target concept, I. Efthymiopoulos, CERN (18'+2')	11:25	Summary Report on NED Activities G. De Rijk CERN (30+5mn)
11:20	HT-3 : Achievements of CTF3, P. Skowronski, CERN, (18' +2')	11:30	HT13: Code benchmarking with beam experiments, L. Groening, GSI, (18'+2') (18'+2')		
11:40	HT-4 : Commissioning results of the superconducting photoinjector for ELBE at FZ Rossendorf, J. Teichert, FZR (18'+2')	11:50	HT-14 : LHC crab cavities, R. Calaga, BNL/LARP, (18'+2')		
12:00	HT-5: Pulsed magnets with curved shape for FAIR, P. Fabbricatore, INFN Genoa, (18'+2')	12:10	HT15: The NED conductor review: experience gained and outlook for future development; G. de Rijk, CERN (18'+2')		
12:20	HT-6 : First operation of the MICE beam line, M. Ellis, Brunel Univ. & RAL (18'+2')				
12:40	*Lunch*	12:30	*Lunch*	12:00	*Lunch*
14:00	PARALLEL	14:00	PARALLEL	14:00	PLENARY (Council Room)
	Networking/Joint Research Activities		Networking/Joint Research Activities	Council Room	NA summary Report Chair: R. Aleksan
304-1-007	ELAN	304-1-007	ELAN	14:00	Summary Report on ELAN Activities F. Richard LAL (20+5mn)
60-6-002	BENE	60-6-002	BENE	14:25	Summary Report on BENE Activities V. Palladino INFN (20+5mn)
5-1-001	HHH	5-1-001	HHH	14:50	Summary Report on HHH Activities W.Scandale/F. Zimmermann CERN (20+5mn)
Room C	SRF	Room C	SRF	15:15	General Discussion
Room A	PHIN	Room A	PHIN	15:45	Concluding remarks R. Aleksan CEA/IN2P3 (15mn)
Room B	HIPPI	Room B	HIPPI		
160-1-009	NED	160-1-009	NED		
16:00	*Coffee Break*	16:00	*Coffee Break*	16:00	*Adjourn*
16:30	PARALLEL	16:30	PARALLEL	16:00	
	Networking/Joint Research Activities		Networking/Joint Research Activities	16:30	Steering committee
304-1-007	ELAN	304-1-007	ELAN		Main Building Salle B near the Council room
60-6-002	BENE	60-6-002	BENE	18:00	End of Steering committee meeting
5-1-001	HHH	5-1-001	HHH		
Room C	SRF	Room C	SRF		
Room A	PHIN	Room A	PHIN		
Room B	HIPPI	Room B	HIPPI		
160-1-009	NED	160-1-009	NED		
		17:30	Governing Board (Main building 6th floor)		
19:30	*Dinner at the Globe*	20:00			

B. Management Report (financial information)

1. Justification of the resources deployed

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	1	Participant short name	CEA

		Management
		Total effort in person-months [1] 9,77
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)
Personnel cost [2]	76 882,69	Permanent personnel for CARE management: CARE coordinator and deputy coordinator, financial assistant, secretary, accounting office.
Durable equipment	0,00	
Consumable and prototyping	167,78	Travel Agency Fees
Travel	2 184,93	Participation to the CARE Steering Committee at CERN (17-18/09/2008): 1 person; Participation to CARE'08 meeting at CERN (2-5/12/2008): 2 persons
Audit certificate	8 500,00	Audit 2006 & 2007 and Audit 2008

		N1-ELAN - Electron Linear Accelerator Network
		Total effort in person-months [1]
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)
Personnel cost [2]	0,00	
Durable equipment	0,00	
Consumable and prototyping	450,75	
Travel	8 580,46	Participation to TTC meeting at DESY (13-17/01/2008): 4 persons; participation to TILC-GDE Meeting at KEK (2-5/03/2008): 1 person; participation to TTC meeting at IUAC-Dehli (20-23/10/2008): 2 persons.

		N2-BENE - Beam for European Neutrino Experiments
		Total effort in person-months [1]
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost [2]	0,00	
Durable equipment	0,00	
Consumable and prototyping	0,00	
Travel	219,57	Participation to a BENE Steering Group Meeting at CERN (05/02/2008): 1 person

		N3-HHH - High Energy High Intensity Hadron Beams
		Total effort in person-months [1]
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost [2]	0,00	
Durable equipment	0,00	
Consumable and prototyping	155,00	Registration fee to CARE'08 meeting (2-5/12/2008)
Travel	667,56	Participation to CARE'08 meeting at CERN (2-5/12/2008). 1 people

		R1-SRF - Superconducting Radio Frequency
		Total effort in person-months [1] 0,79
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost [2]	4 286,18	Permanent personnel for Work Package 6 (Tuners) Task 8.3 (CEA Tuners): warm test of new tuner prototype.
Durable equipment	11 713,84	Amortization costs of durable equipment for EP bench (WP5 Surface preparation), amplifiers (WP8 Tuners) and Ionic pumps (WP10 Integrated tests)
Consumable and prototyping	0,00	
Travel	0,00	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months [1]	57,76
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]	337 427,06	Preparation and/or test of the elliptical and spoke cavities fabricated in the workpackage 3 ; follow-up of the fabrication of high power couplers ; assembly and test of the couplers ; reporting ; writing and presentation of final report	
Durable equipment	185 743,25	Last terms of payment of cavity prototype ; mechanical parts of couplers; high power RF equipements (WP3)	
Consumable and prototyping	120 543,09	Tools for preparation of prototypes in clean room ; equipements for coupler processing (diagnostics, pumping system, data control system) ; modification of horizontal cryostat interfaces	
Travel	3 078,04	Fabrication follow up of couplers ; last JRA meeting at CERN (4 persons); CARE meeting (1 person) at CERN	

		R4- NED - Next European Dipole	
		Total effort in person-months [1]	6,27
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]	3 410,50	Heat transfer measurements (Bertrand Baudouy). WP2 : Thermal studies and quench protection (TSQP)	
Durable equipment	4 983,81	Instrumentation of the cryostat used for Heat transfer measurements. WP2 Thermal studies and quench protection (TSQP)	
Consumable and prototyping	164,36	Expenses for organisation of Thermomag-07 workshop on 19-21 November 2007, Paris, CARE-HHH workshop on Heat Generation and Transfer in Superconducting Magnet	
Travel	0,00		

Total direct eligible costs	**769 158,87**		
Total indirect costs	**266 075,05**		
Total costs [3]	**1 035 233,92**	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	2	Participant short name	UCLN

		Management	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	400,00	audit certificate	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	1
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping	35,90	Express mail	
Travel	282,04	Meeting MICE 9-12/2/2008 Rutherford Lab-UK: travel and stay	

Total direct eligible costs	717,94		
Total indirect costs	63,59		
Total costs (3)	781,53	Global estimate of the total costs for AC contractors (not only the eligible costs)	781,53

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	3	Participant short name	CNRS/IN2P3-CNRS + UNIV

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	2 612,56	audit certificate 2007	
Audit certificate	387,44	audit certificate 2008	
		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	0,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	9 644,83	LPGP - 1 travel to collaboration meeting with LLC ; UPS/LAL - 7 travel to working group meetings	
		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	0,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	702,00	LPGP-1 travel to collaboration meeting with LLC	
		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months (1)	55,9
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	276 152,00	LAL -Engineers and technicians cost for the experimental activity (A.Variola,T.Chabaud,E.Herry,B.Mercier, C.Prevost,A.Thiebault, B.Mouton, P.Lecoeur, M.Lacroix,H.Jenhani, W.Kaabi) IPNO - Salaries of 2 engineers at different part -	
Durable equipment	79 205,27	LAL - Depreciation costs (TiN bench, couplers prototypes….) IPNO - Cables, commutator, control, pipe, micrometer…-	
Consumable and prototyping	268,19	LAL - HD pressure regulator	
Travel	0,00		
		R2-PHIN - Photo Injector	
		Total effort in person-months (1)	135,7
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	441 115,39	LAL - Engineers and technicians cost for the experimental activity (M.Bernard, B.Leblond, C.Prevost, J.Prevost, R.Roux, G.Bienvenu, O.Vitez, B.Mouton, P.Lecoeur, A.Robert, J.P.Dugal, D Grasset, E.Guerard, M.Jore, A.Gonin) LOA - permanent staff, Mercier Brigitte,Lefrou Thierry, Burgy Frédéric,FAURE Jérôme -	
Durable equipment	82 678,49	LAL - Emitter, laser vacuum chamber, pirani gauge, depreciation	
Consumable and prototyping	29 194,54	LAL - Copper coating, tools, insulated cables, valves, cleaning, linear activator, motor support, adapter rack, pumping chamber, vacuum chamber, PVC, cooling system…… LOA - Materiel Optique, fenêtre en ZnSe -	
Travel	5 489,08	LOA - 4 travels to annual meetingCare and colloquium DIPAC 07; UPS/LAL - 12 travels to Geneva for CTF3 photo-injector installation and tests	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months [1]	20,7
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]	93 880,79	IPNO - Salaries of 4 engineers, 1 researcher and 1 temporay engineer at different part LPSC - permanent staff, Gomez-Martinez	
Durable equipment	0,00		
Consumable and prototyping	9 717,57	IPNO - Connector, cables, analogic card, copper-sheet, probes…-	
Travel	1 190,99	IPNO - 5 travels to Genève	

Total direct eligible costs	1 032 239,14		
Total indirect costs	206 447,83		
Adjustments to previous periods	271,95		
Total costs [3]	1 238 958,92	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	4	Participant short name	GSI

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate	1 238,20	audit certificate	
		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months [1]	0,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]			
Durable equipment			
Consumable and prototyping			
Travel	2 619,21	an. HHH-Meeting, Nov23-25, 2008, Geneva/CH, 3 Pers.	
		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months [1]	38,3
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]	204 914,99	Beam induced fluorencence, 12.8 PM; On-line transmission control, 0.5 PM; Preparation, execution, evaluation, simulation of beam dyn. exp, 21.3 PM; Code development, 2.5 PM; WP management, 1.2 PM	
Durable equipment	0,00		
Consumable and prototyping	15 422,68	cabels for Diagnostics (light conductors); UHV components; electr. equipm.	
Travel	16 583,94	all WP5: Workshop HB2008, Aug25-29, 2008, Nashville/USA, 3 Pers.; Linac2008 Conf., Sep29-Oct03, 2008, Vancouver/Can, 3 Pers.; an. HIPPI Meeting, Oct29-31, 2008, Geneva/CH, 5 Pers.; an CARE Meeting, Dec02-04, 2008, Geneva/CH; 1 Pers.; visit at manufacturer for beam diagn. comp., Jun12 2008, Ingelheim/Germany; 3	

Total direct eligible costs	240 779,02		
Total indirect costs	34 158,79		
Adjustments to previous periods			
Total costs [3]	274 937,81	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	
Justify any deviations with respect to the planned budget			

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	5	Participant short name	IAP-FU

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months [1]	25 (13 = 12 university + 1 HIPPI EU)

Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*
Personnel cost [2]	2 662,41	1 working student under contract from 1.01.2006 until 15.07.2008: design and construction of the mechanical setup of the SC CH cavity tuner (WP3).
Durable equipment		
Consumable and prototyping	69 352,58	Accessories, supplies and components for the mechanical tuner test stand (WP3) and for the normal conducting CH-structure (WP2).
Travel	5 202,65	Participation to the HIPPI Work Package meetings (19.5., Darmstadt, Germany, 2 persons; 10.6.-11.6., Grenoble, France, 2 persons), the HIPPI Annual Meeting (28.10.-31.10., Geneva, Switzerland, 4 persons) and to the HB2008 Beam Dynamics Workshop (23.8.-31.8., Nashville, USA, 1 person).

Total direct eligible costs	77 217,64		
Total indirect costs	15 443,53		
Adjustments to previous periods	1 959,76	Costs of the audit certificates for the years 2006,2007 and 2008.	
Total costs [3]	94 620,93	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	220000

Justify any deviations with respect to the planned budget

Personnel cost:
Scheduled budget was spent.

Consumable and prototyping:
Scheduled budget was spent on the "main items" of the IAP-FU contribution to the HIPPI Collaboration (these are: WP2: normal conducting CH cavity; WP3: tuner for SC-CH cavity). Due to the financial support from the EU both deliverables could be completed in time during this last reporting period.

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	6	Participant short name	DESY

		Management	
		Total effort in person-months [1]	16(8)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate	1 079,50	audit certificate	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months [1]	0,5(0,5)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]			
Durable equipment			
Consumable and prototyping			
Travel	3 994,54	CARE-HHH-ABI annual workshop on Tune and Chromaticity Diagnostics, Bad Kreuznach (3 physicists); LLRF Workshop, New York (2 physicists); HHH coordination meeting, CERN (1 physicist)	

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months [1]	90(30)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]	83 571,33	WP 1 Management & Communication: administrative tasks (1 physicist 12 person-months); Task 3.2 Seamless cavities: Several 3-cell units have been fabricated by hydroforming from seamless tubes and also long and short end groups connected with three cell units. (1 scientists 12 person-months); Task 5.4 Dry ice cleaning: Preparation of samples for task 6.3; (1 technician 6 person-months);	
Durable equipment			
Consumable and prototyping	399,55	freight	
Travel	11 105,08	Steering committee in Paris (2 physicits); EPAC 08, Genova, (2 physicist); Steering committee meeting at CERN (2 physicists); CARE08 meeting at CERN (6 persons)	

Total direct eligible costs	100 150,00		
Total indirect costs	19 814,10		
Adjustments to previous periods	6 000,27		
Total costs [3]	125 964,37	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	425 964

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	7	Participant short name	FZJ

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	3 400,00	Audit of Juelich CARE activities	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	3 360,08	two persons to four workshops in Moscow	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	6 460,37	5 persons to workshops in Geneva, Chamonix, Genova, Berlin, Paris	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months (1)	19,39
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	115 133,93	permanent personnel salary for work on WP3 SC spoke and for work on WP5 BD. Electrodynamics simulation follow-up of cavities, construction work on 352 MHz cavity, coupler design, report on beam dynamics calculations, report on diagnostics, RF measurement of cavity properties.	
Durable equipment	0,00		
Consumable and prototyping	54 699,29	Copper coating of one end cap sample; chemical cleaning of cavity; stiffening structure; performance tests; antenna and probe;	
Travel	2 918,83	Workpackage meetings; CARE meetings; travels to synchronize with laboratories and companies supplying cavity components	

Total direct eligible costs	185 972,50	sum of all Network Activities and JRA and Audit costs.
Total indirect costs	115 905,33	
Adjustments to previous periods	-1 328,99	**correction of overhead factor for 2007**
Total costs [3]	300 548,84	**Global estimate of the total costs for AC contractors (not only the eligible costs)**

Justify any deviations with respect to the planned budget

In consent with the CARE project leader unspent money of BENE (about 12 kEuro) was used to cover unexpected additional costs of HIPPI (more than 26 kEuro). Similar holds true for ELAN money but on the 140 Euro level.

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	8	Participant short name	TUM

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months [1]	0.5
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [2]			
Durable equipment			
Travel	2 525,62	participation and presentation of BENE related material at workshops: Heidelberg (24.-26.01.07, 1 person) and CERN, Geneva (29.-30.04.07, 1 person)	

Total direct eligible costs	2 525,62		
Total indirect costs	505,12		
Total costs [3]	3 030,74	Global estimate of the total costs for AC contractors (not only the eligible costs)	4000

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	9	Participant short name	FZR

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	740,00	audit certificates 2006 and 2007	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months [1]	0.5 (0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost [2]	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	995,83	Participation Miniworkshop "Characterization of High Brighness Beams" Zeuthen Germany (1 person), CARE 2008 Annual Meeting, Geneva, Switzerland (1 person)	

		R2-PHIN - Photo Injector	
		Total effort in person-months [1]	42 (0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	2 403,35	WP2: vacuum parts for the improvement of the of cathode transfer system; WP4: mechanical modification of the vacuum vessel and magnetic shielding of the SRF gun cryomodule	
Travel	1 000,91	WP1, Participation at the sixth PHIN collaboration meeting, Lecce, Italy (1 person)	

Total direct eligible costs	5 140,09		
Total indirect costs	880,02		
Adjustments to previous periods	4 886,32	**Personnel cost for PostDoc (Dr. Friedrich Staufenbiel) for period July, 1 - 31, 2007, JRA R2 PHIN Photo Injector, WP2, working for installation of SRF gun, cryo-diagnostics**	
Total costs [3]	10 906,43	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	225 000,00

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	10	Participant short name	INFN

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months [1]	3,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	6 755,69	**INFN-LNF:** Susanna Guiducci - CERN (CH) 15/18.10.2007 - CLIC07 Workshop (€ 656,79); Susanna Guiducci - CERN (CH) 29/31.10.2007 - CARE 07 Annual Meeting (€ 630,94); Carlo Pagani - Warsaw (PL) 09/10.06.2008 - Invited talk at "ILC-ECFA Workshop" (€ 919,54); Susanna Guiducci - CERN (CH) 03/06.12.2008 - CARE 08 Annual Meeting (€ 720,34); David Alesini - CERN (CH) 14/17.10.2008 - CLIC08 Workshop (€ 866,29). **INFN-MI**: Carlo Pagani - Peking and Shangai (China) 03/10.02.2007 - Partecipation at the "9th ACFA ILC Physics and Detector Workshop and ILC GDE Meeting at Peking (€ 2.267,79); Carlo Pagani - Chicago (USA) 15/21.11.2008 - International Linear Collider GDE Workshop and Meeting at FermiLab (€ 694,00).	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months [1]	3,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	8 394,75	**INFN-NA:**Vittorio Palladino - Abingdon (UK) 21/25.10.2007 - Topical Muon Workshop (€ 854,12); Vittorio Palladino - CERN (CH) 25/31.10.2007 - CARE General Meeting (€ 811,80); Vittorio Palladino - CERN (CH) 17/21.02.2007 - Meeting of the International Scoping/Design Study on Neutrino Factory and of the BENE Steering Group (€ 767,15); Vittorio Palladino - Paris (FR) 16/19.04.2007 -CARE Joint Steering Committee Meeting(€ 948,53); Vittorio Palladino - CERN (CH) 12/14.09.2007 - CARE Joint Steering Committee Meeting(€ 493,82); Gabriella Catanesi - CERN (CH) 02/06.12.2008 - CARE 08 Annual Meeting(Fee only - € 96,86); Paolo Strolin - CERN (CH) 07/09.12.2008 - "New Instruments in Neutrino Relics and Mass" Workshop (€ 339,60); Vittorio Palladino - Valencia (ES) 25/06-05/07.2008 - "NUFACT 08" Workshop (€ 300,00); Vittorio Palladino - Paris (FR) 08/11.04.2008 - CARE Joint Steering Committee Meeting (€ 682,11); Vittorio Palladino - CERN (CH) 10/14.09.2008 - "NNN 08" Workshop (€ 1.104,13); Vittorio Palladino - CERN (CH) 16/19.09.2008 - CARE Joint Steering Committee Meeting(€ 541,20);Vittorio Palladino - CERN (CH) 30/11-08/12.2008 partecipation as coordinator of BENE Activity at CARE 08 (€ 1.455,43).	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	0,00		

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months [1]	LNF 31 (12), LNL 47 (35), MI 12 (2), RMII 1
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	127 769,57	**INFN-LNF:** Enrica Chiadroni - Contract from 01.01.2008 to 31.12.2008 (€ 33.574,90) **INFN-LNL:** Alessandro Minarello - Contract from 01.01.2008 to 25.11.2008 (€ 29.599,76); Silvia DeAmbrosis - Contract from 02.01.2008 to 31.12.2008 (€ 27.402,85); Giulia Lanza - Contract from 02.01.2008 to 31.12.2008 (€ 27.402,85). **INFN-MI**: Simone Cialdi - Contract from 11.01.2008 to 12.10.2008 (25%) (€ 7.777,67); Laura Monaco - Contract from 01.01.2008 to 31.01.2008 (€ 2.011,54).	
Durable equipment	4 442,10	**INFN- LNF** € 217,50 (Depreciation cost for Notebook Latitude); **INFN-LNL** € 684,96 (Depreciation Costs for Switching Power Supply Mod. S4000); **INFN-RMII** € 3.539,64 (Depreciation Costs for Gaussmeter and Laser Nd-YAG).	
Consumable and prototyping	50 055,81	**INFN-LNL:** Purchasing of: Stylus, LIS 3,2.5um Radius, Gray Color Coded (€ 1.988,00); PTF Tube and Valves (€ 4.890,00); RF Connectors (€ 980,13); Zirconium Oxide (€ 2.421,00) **INFN-RMII**: Purchasing of: Copper Coils (€ 1.250,00); Stainless Steel Tube with Flanges (€ 1.850,00); Mechanical Parts (€ 790,00). **INFN-MI**: Purchasing of: Liquid Nitrogen (€ 4.571,26); Motor Boxes (€ 860,02); Cables and Connectors (€ 2,163,41 Adaptators, Bellows and Flanges (€ 2.000,00); Angle Vacuum Valves (€ 1.295,00); Cables and Connectors (€ 2.314,88); Amplifiers, Attenuators, Commutators and Cables (€ 2.483,00); Nut Screw, Motor Base, Driving Screw and Lock Nut (€ 1.267,00); Connectors and End Plugs (€ 1.400,77); Aluminium Plates and Angles (€ 658,51); Stacked Multilayer Actuators (€ 9.960,00); NbTi Disks (€ 884,00); Liquid Helium (€ 1.855,00); Connectors, Tools and Electronic and Electric Materials (€ 4.173,83).	
Minor Subcontracts	19 996,50	**INFN-LNL:** Construction of 1 Niobium Cavity and 1 Copper Cavity (€ 15.100,00). **INFN-MI**: Assembling and Welding of WPM Sensors (€ 259,00); Construction of 2 Mock Ups of End Group (€ 3.050,00);Construction of Screw Cubes, Ball Bearing Spacers and Nut Screws (€ 1.587,50).	
Travel	22 138,59	**INFN-LNF:** Enrica Chiadroni - Hamburg (DE) 15/24.01.2008 - Optical Diffraction Radiation Experiment (€ 1.735,26); Rossano Sorchetti - Hamburg (DE) 15/24.01.2008 - TTP2 Istallattion for Optical Diffraction Radiation (€ 1.763,96); Luciano Cacciotti - Hamburg (DE) 15/24.01.2008 - TTP2 Istallation for Optical Diffraction Radiation (€ 1.755,36); Enrica Chiadroni - Genova (IT) 23/27.06.2008 - Partecipation to the "11th European Particle Accelerator Conference - EPAC 08" (€ 785,69). **INFN-LNL**: Silvia DeAmbrosis - Newport News (USA) 21/25.07.2008 - Invited to present scientific results on Seamless Cavity Production at the "TFSRF 08 Conference" (€ 2.252,69); Giulia Lanza - Newport News (USA) 21/26.07.2008 - Invited to present scientific results on Alternative Electrolytes for Niobium Electropolishing (€ 2.256,19).**INFN-RMII**: Roberto Russo - Warsaw (PL) 16/19.09.2007 - CARE Meeting (€ 768,30). **INFN-MI**: Massimo Fusetti - Jefferson Lab., Newport News (USA) 14/23.04.2007 - Caracterization of HPR System and Cavity washing (€ 2.222,53); Paolo Michelato - Jefferson Lab., Newport News (USA) 14/23.04.2007 - Caracterization of HPR System and Cavity washing (€ 2.82 Rocco Paparella - CERN (CH) 28/31.10.2007 - CARE 07 Annual Meeting (€ 735,63); Rocco Paparella - Berlin (DE) 24/29.02.2008 - Cold Caracterization in CW of the Coaxial Tuner for the SC Cavity at BESSY (€ 1.304,15); Angelo Bosotti - Berlin (DE) 24/29.02.2008 - Cold Caracterization in CW of the Coaxial Tuner for the SC Cavity at BESSY (€ 1.293,29); Angelo Bosotti - Berlin (DE) 27/29.01.2008 - Work on Coaxial Tuner at BESSY (€ 741,82); Nicola Panzeri - Berlin (DE) 27/29.01.2008 - Work on Coaxial tuner at BESSY (€ 754,47); Massimo Fusetti - Hamburg (DE) 27/30.10.2008 - Collaboration Meeting (€ 945,00).	

		R2-PHIN - Photo Injector
		Total effort in person-months [1] 27 (6)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost [2]	22 353,05	**INFN-MI:** Simone Cialdi - Contract from 01.01.2008 to 10.01.2008 (€ 1.197,79); Simone Cialdi - Contract from 11.01.2008 to 12.10.2008 (68%) (€ 21.155,26).
Durable equipment	0,00	
Consumable and prototyping	16 773,58	**INFN-LNF:** Purchasing of: UV Fused Silica Piano Convex Lenses and UV Fused Silica Windows (€ 3.620,00); Silica Quadrant-Cell Photoreceiver, Firewire and Lens (€ 9.045,58); Optical Thin Plates for Pulse Shaper (€ 1.962,00). **INFN-MI**: Purchasing of: Coated Lenses, Waveplate and Polarizer (€ 2.146,00)
Minor Subcontracts	5 810,00	**INFN-LNF:** Construction of: 20 Adapters for Light Mirrors (€ 2.460,00); Mechanical Parts (€ 2.500,00). **INFN-MI**: Repair of Power Supply and Nd:YAG in order to complete the tests of Pulse Shaping (€ 850,00).
Travel	14 525,77	**INFN-LNF:** Andrea Ghigo - Trieste (IT) 25/28.03.2008 - Workshop on Laser Synchronizer (€ 610,72); Gianni Fontana - Ostia Antica/Rome (IT) 23.04.2008 - Contacts with COMEB firm (€ 39,69); Gianni Fontana - Ostia Antica/Rome (IT) 03.06.2008 - Contacts with COMEB firm (€ 39,69); Andrea Ghigo - Lecce (IT) 16/18.07.2008 - PHIN Coll. Meeting (€ 502,20); Carlo Vicario - Lecce (IT) 16/19.07.2008 - PHIN Coll. Meeting (€ 651,35); Ilario Boscolo - Lecce (IT) 14/20.07.2008 - PHIN Coll. Meeting (€ 837,17); Andrea Ghigo - Milano (IT) 30/09-03/10.2008 - Test on UV Pulse-Shaper and Final Report (€ 773,83); Andrea Ghigo - Milano (IT) 21/23.12.2008 - Meeting for JRA2 Final Scientific Report (€ 507,38); Carlo Vicario - CERN (CH) 18/23.11.2007 - PHIN CTF3 Laser Commissioning (€ 935,02); Massimo Petrarca - CERN (CH) 18/23.11.2007 - PHIN CTF3 Laser Commissioning (€ 959,92); Andrea Ghigo - CERN (CH) 05/08.12.2007 - CTF3 Commissioning (€ 200,00); Carlo Vicario - CERN (CH) 22/27.06.2008 - CTF3 Laser Injector Commissioning (€ 643,20); David Alesini - CERN (CH) 29/09-02/10.2008 - Test on CTF3 RF Injector (€ 1.057,51); Fabio Marcellini - CERN (CH) 29/09-02/10.2008 - Test on CTF3 RF Injector (€ 1.062,51); Andrea Ghigo - CERN (CH) 01/05.12.2008 - CARE 08 Coll. Meeting (€ 1.227,14); Caterina Biscari - CERN (CH) 02/04.12.2008 - CARE 08 Coll. Meeting (€ 630,62); Giancarlo Gatti - CERN (CH) 01/07.12.2008 - CARE 08 Coll. Meeting (€ 1.167,26). **INFN-MI**: Ilario Boscolo - Frascati (IT) 29/04-02/05.2007 - Comb-FEL Meeting (€ 178,00); Ilario Boscolo - Frascati (IT) 11/14.07.2008 - Organization and preparation with the Frascati Team of the Sixth CARE-PHIN Meeting (€ 715,26); Ilario Boscolo - Frascati (IT) 21/28.09.2008 - Meeting with the Frascati Team in order to discuss the scientific results of PHIN Activity (€ 728,36); Ilario Boscolo - CERN (CH) 20/21.02.2007 - Works on CLIC Laser (€ 348,48); Ilario Boscolo - CERN (CH) 27/28.11.2007 - Work on CLIC Phase-Coding (€ 359,04); Simone Cialdi - CERN (CH) 27/28.11.2007 - Meeting with the team working on CARE-PHIN (€ 351,42).
Audit Certificate Costs	6 482,08	**INFN-LNF:** Audit Certificate related to Third and Fourth Annual Reports - Dr. Ugo Braico (€ 3.977,05); Audit Certificate related to the Fifth Annual Report - Dr. Ugo Braico (€ 2.505,03).

		R3- HIPPI - High Intensity Pulsed Proton Injector
		Total effort in person-months [1] 7 (1)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost [2]	2 177,75	**INFN-MI**: Simone Cialdi - Contract from 11.01.2008 to 12.10.2008 (7%) (€ 2.177,75).
Durable equipment	0,00	
Consumable and prototyping	11 364,62	**INFN-MI**: Purchasing of: Metal Angle Valves (€ 2.500,00); Elbows, Valves, Adaptors and Connectors (€ 2.560,60); 4 Valves (€ 748,00); 5 stacked Ceramic Multilayer Actuators (€ 3.340,00); Flanges and Screws for Cavity Interface (€ 1.370,00); Caps and Sections (€ 846,02).
Travel	2 458,62	**INFN-MI**: Nicola Panzeri - Orsay (FR) 26/27.04.2007 - HIPPI WP3 Meeting (€ 515,51); Nicola Panzeri - Orsay (FR) 26/28.09.2007 - HIPPI 07 Annual Meeting (€ 543,76); Nicola Panzeri - CERN (CH) 29/31.10.2008 - HIPPI 08 Annual Meeting (€ 646,75); Paolo Michelato - CERN (CH) 02/04.12.2008 - CARE 08 Annual Meeting (€ 463,60); Paolo Pierini - CERN (CH) 02/04.12.2008 - CARE 08 Annual Meeting (€ 289,00).

		R4- NED - Next European Dipole	
		Total effort in person-months [1]	*
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	12 449,00	**INFN-GE**: Purchasing of Liquid Helium € 12.449,00.	
Travel	0,00		
Total direct eligible costs	333 947,48		
Total indirect costs	60 331,78		
Adjustments to previous periods	1 141,81	**ADJ. to 2007 - INFN-MI: JRA1 Consumable and Prototyping** - Purchasing of: Low Noise Photodiodes (€ 553,58). **JRA2 - Consumable and Prototyping** - Purchasing of: Low Noise Photodiodes (588,23)	
Total indirect costs related to Adjustments	228,36		
Total costs [3]	395 649,43	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	800 649

Justify any deviations with respect to the planned budget

* For JRA4-NED there is no human effort in 2008. The costs reported are for the replacement of the Liquid Helium used for the measurements performed in the previous years.

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-50639	Project acronym	CARE
Participant N°	11	Participant short name	TEU

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate	4 985,00	audit certificate	

		R2-PHIN - Photo Injector	
		Total effort in person-months (1)	5,6
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	33 472,88	Setting up, characterizing and analyzing data for a mirror-based and a fiber-based ellipsometer for inline study of photocathode growth. WP2, Task 2.7 & 2.11	
Durable equipment			
Consumable and prototyping	25 126,19	Mirrors, fibers, polarizers, etc. for feasability study ellipsometry for photocathode growth research. One version uses standard optics (mirrors) and may be sussectible to allignment errors and vibrations when long arms are used. The other version uses fibers an may be much less succectible to allignment and vibration errors. This should result in a robust ellipsometer.	
Travel	3 298,52	CARE/PHIN meetings,Lecce, Italy (16-07-2008; 1person); Zeuthen, Germany (1 person); FEL 08 conference, South Korea (22-08-2008; 1person): Presented results on ellipsometry study photocathode growth.	

		R4- NED - Next European Dipole	
		Total effort in person-months (1)	0,96
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	6 490,44	Heat treatment and impregnation NED-SMC Nb3Sn cables	
Durable equipment			
Consumable and prototyping	262,83	Consumables for NED-SMC cable preparation	
Travel	410,72	NED-SC meeting at CERN (3-11-2008; 1 person)	

Total direct eligible costs	74 046,58		
Total indirect costs	36 334,10		
Adjustments to previous periods	1 127,87		
Total costs [3]	111 508,55	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	
Justify any deviations with respect to the planned budget			

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	12	Participant short name	TUL

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	0,00		

Total direct eligible costs	0,00		
Total indirect costs	0,00		
Adjustments to previous periods			
Total costs (3)	0,00	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	13	Participant short name	IPJ

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	0,00	audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months [1]	0,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost [2]	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	0,00		

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months [1]	0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	0,00		

Total direct eligible costs	0,00		
Total indirect costs	0,00		
Adjustments to previous periods			
Total costs [3]	0,00	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	0,00

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	14	Participant short name	WUT-ISE

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate		audit certificate	

Total direct eligible costs	0,00		
Total indirect costs	0,00		
Adjustments to previous periods	0,00		
Total costs [3]	0,00	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	0,00

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	15	Participant short name	WUT

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	1 200,83	audit certificate	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	67,64	CARE07 meeting 29 -31 Nov 2007, Geneva, NED	

		R4- NED - Next European Dipole	
		Total effort in person-months [1]	4(0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	4 377,62	Liquid helium costs	
Travel	0,00		

Total direct eligible costs	5 646,09		
Total indirect costs	889,05		
Adjustments to previous periods			
Total costs [3]	6 535,14	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	8 535,00
Justify any deviations with respect to the planned budget			

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	16	Participant short name	csic

		Management	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	1 050,00	audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	2.0
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	1 258,17	CLIC08 (14-17 October,1 person), CARE08 (2-5 December, 1 person); WP:BDYN	

Total direct eligible costs	2 308,17		
Total indirect costs	251,63		
Adjustments to previous periods	7 871,39	Sdjustement of indirect cost from 2004-2007	
Total costs (3)	10 431,19	Global estimate of the total costs for AC contractors (not only the eligible costs)	

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE 2008
Participant N°	17	Participant short name	CERN

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	2.70(0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** **description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)**	
Personnel cost [(2)]	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	2 829,52	Participation to ILC and CLIC meetings supported by ELAN Meeting LAL/Orsay 01-03 Feb. 2008 France (1 person); LCWS Conference01-05 Sept. 2008 Chicago USA (1 person), Channeling Conference 26/10 - 01/11 2008 Italy (1 person)	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	7.25 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** **description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)**	
Personnel cost [(2)]	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	12 622,52	WHEPP workshop in Chennai, India,2-13 January 2008 (1 person) IDS meeting at RAL, 15-18 January 2008 (2 persons) NUFACT08, Valencia, 30 June-5 July 2008 (3 persons) CPT@ICTP worshop, Trieste, 2-5 July 2008 (1 person) Symposium on next generation Neutrino and Nucleon decay detectors, Paris, 10-13 September 2008 (1 person) IEEE-NSS, Dresden Germany, 20-25 October 2008 (1 person)	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	23.28 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** **description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)**	
Personnel cost [(2)]	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	16 783,67	Organization of multiple CARE-HHH workshops, expert exchanges, and dissemination activities. APD WS on IR upgrade IR07 7-9 Nov Frascati (4 HHH participants supported) ABI-WS on Schottky, Tune and Chromaticity Diagnostics 11-13 Dec 07 Chamonix (15 HHH participants supported) Joint APD-Mini-WS on LHC Crab Cavities 25-26 Feb 08 BNL (3 participants supported) Subsistence for participation in SPS Beam chrystal experiments in April 08 (2 experts from INFN), subsistence for participation in electron-cloud studies April 08 (1 expert from SLAC, cost shared) AMT-WS WAMSDO 19-23 may 08 CERN (2 participants supported) APD-Mini-WS on beam-beam compensation 28 Aug 08 CERN (1 participant) General CARE meeting 2-5 dec 08 CERN (2 HHH participations supported)	

		R2-PHIN - Photo Injector	
		Total effort in person-months (1)	12.00 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** **description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)**	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	69 141,16	WP2 Material for photocathode production WP3 Materials for the operation and consolidation of the laser and of its control system WP4 Equipment and ancillaries for the installation int the CTF2 facility	
Travel	5 434,60	Travel to LAL for meetings on RF gun Participation to meetings in the framework of CARE	
		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months (1)	89.00 (14.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** **description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)**	
Personnel cost [2]	90 098,66	Salaries for E. Sargsyan (6 months, beam dynamics studies, WP3 and WP4), R. Wegner (8 months, design of RF structures, WP2)	
Durable equipment	0,00		
Consumable and prototyping	3 588,71	Surface treatment and cooling equipment for prototype for DTL studies (WP2)	
Travel	6 485,13	Participation of Deputy Coordinator to the CARE Steering Committee Meeting (Paris, 9.4); participation of 4 persons (Vretenar, Ramberger, Gerigk, Wegner) to the WP2 Meeting in Grenoble; participation of 1 person (Sargsyan) to the WP5 Meeting in Darmstadt; conference fees for 5 persons for the CARE08 Meeting at CERN; participation of the 3 ESAC members to the HIPPI Annual Meeting at CERN (30.10).	
		R4- NED - Next European Dipole	
		Total effort in person-months (1)	9.60 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** **description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)**	
Personnel cost [2]	0,00		
Durable equipment	0,00		
Consumable and prototyping	323 371,44	Alstom-MSA invoice received in October 2008 for an amount of 209 504.41 Euros for the delivery of 25 km of Internal Tin strand. EAS/SMI invoices received in 2008 for an amount of 106 993.73 Euros for the fabrication of 6256 m of PIT strand. The last EAS invoice (9% of the order) has been received in October 2008 for an amount of 45 631.27 Euros for the delivery of 3797 m of PIT strand. The test of this material is in progress and the payment will follow under some weeks.	
Travel	0,00		

Total direct eligible costs	530 355,41		
Total indirect costs	41 396,79		
Adjustments to previous periods	0,00		
Total costs [3]	**571 752,20**	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	2 273 744,69
Justify any deviations with respect to the planned budget			

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	18	Participant short name	UniGE

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	1 730,40	AUDIT KPMG	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months [1]	7
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]			
Durable equipment			
Consumable and prototyping	0,00 €		
Travel	495,60 €		
		NB taux de conversion € -- CHF	1,4874
Total direct eligible costs	2 226,00 €		
Total indirect costs	322,90 €		
Total costs [3]	2 548,90 €	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	19	Participant short name	PSI

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate			

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months [1]	8,7
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	95 155,84	WP9 LLRF: Implementation of RF Gun control at PSI XFEL test facility LLRF Gun Control Coordination between PSI Villigen and DESY Hamburg	
Durable equipment			
Consumable and prototyping	24 979,08	VME-Equipment, cables, amplifier, power supply, directional coupler	
Travel			

Total direct eligible costs	120 134,92		
Total indirect costs	23 788,96		
Adjustments to previous periods			
Total costs [3]	143 923,88	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	20	Participant short name	STFC

		Management
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)
Audit certificate	5 492,92	audit certificate

		N1-ELAN - Electron Linear Accelerator Network
		Total effort in person-months (1)	0,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)
Personnel cost (2)		
Durable equipment		
Consumable and prototyping		
Travel	184,18	CARE08 meeting, CERN 2-4Dec08

		N2-BENE - Beam for European Neutrino Experiments
		Total effort in person-months (1)	0,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost (2)		
Durable equipment		
Consumable and prototyping		
Travel	5 308,23	NuFact08, Valencia, 30Jun to 4July08 (4 people); CARE08, CERN, 2-4Dec08 (2 people); Neutrino meeting, Zurich, 17-18Dec08

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months [1]	38,2
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]	145 103,17	17.2 staff months on WP2, 20.3 on WP4 and 0.7 on WP5	
Durable equipment	3 266,88	CCD camera system	
Consumable and prototyping	4 004,95	Equipment for hardware testing; computer hardware and licenses	
Travel	9 041,56	HIPPI meetings: CERN Mar08 (1 person), GSI May08 (2 people), Grenoble Jun08 (1 pe	
Total direct eligible costs	172 401,89		
Total indirect costs	152 358,33		
Adjustments to previous periods			
Total costs [3]	324 760,22	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	
Justify any deviations with respect to the planned budget			

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	21	Participant short name	ICL

		Management	
		Total effort in person-months [1]	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	1 555,67	audit certificate	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months [1]	0,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [2]			
Durable equipment			
Consumable and prototyping			
Travel	385,45	Delegates (2) to CARE08, Geneva, Dec. 2-4	

Total direct eligible costs	1 941,12		
Total indirect costs	77,09		
Adjustments to previous periods	-2 770,14	**The auditors have taken the tax out of the travel expenditure of the previous periods**	
Total costs [3]	-751,93	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	
Justify any deviations with respect to the planned budget			

[1] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[2] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[3] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	22	Participant short name	UMA

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	600,00	audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	4 222,47	Travel costs to Various care meetings by: Prof. R. Barlow & A. Bungau - Rome 23-25 Jan-08, Prof. Barlow- Geneva 23-27Jun-08, A. Bungau- Rome EPAC Conf -22-26 Jun 08, R. Appleby-Sweden 13-15 Apr 2008, Bungau -Stockholm 25-28 Aug 08, Bungau-Berlin -6-8th Apr 08.	

Total direct eligible costs	4 822,47		
Total indirect costs	844,49		
Adjustments to previous periods			
Total costs (3)	5 666,96	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	12 000,00

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

2. Forms C - Financial Statements

Form C – Financial Statements (Appendix 2)

1 CEA

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	COMMISSARIAT A L'ENERGIE ATOMIQUE		
Legal Type	Governemental		
Contact Person	Roy Aleksan	Telephone	33 1 69083347
Telecopy	33 1 69086428	E-mail	aleksan@dapnia.cea.fr
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities 0		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	671 350,13	0	0	0	87 735,40	0	10 073,34	0	0	0	0	0	769 158,87	
Of which subcontracting					8 500,00								8 500,00	
Indirect costs	217 600,52	0	0	0	48 474,53	0	0,00	0	0	0	0		266 075,05	
Adjustments to previous period(s)														
Total costs	888 950,65	0,00	0,00	0,00	136 209,93	0,00	10 073,34	0,00	0,00	0,00	0,00	0,00	1 035 233,92	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	500 000,00

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			YES
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**KPMG**	**Cost of the certificate**	**6000 € (period 3 & 4 - 2006 & 2007) 2500 € (period 5 - 2008)**
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) +**	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Roy ALEKSAN	**Nathalie JUDAS**
	Date	**Date**
	05/02/2009	**05/02/2009**
	Signature	**Signature**

2 UCLN

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII-CT-2003-506395
Contractors's legal name	Universite Catholique de Louvain (UCL)		
Legal Type	PRIV		
Contact Person	Thierry Delbar	Telephone	(32)10473202
Telecopy	(32)10452183	E-mail	delbar@fynu.ucl.ac.be
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs					400		317,94						717,94	
Of which subcontracting					400								400,00	
Indirect costs							63,59						63,59	
Adjustments to previous period(s)														
Total costs					400		381,53						781,53	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	781,53

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	01/01/2006 to 31/12/2008
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	DGST & PARTNERS	**Cost of the certificate**	400
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	Yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Thierry DELBAR	**Cecile SIBILLE**
	Date	**Date**
	17/02/2009	**17/02/2009**
	Signature	**Signature**

3 CNRS

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Centre National de la Recherche Scientifique- CNRS		
Legal Type	GOV		
Contact Person	M. Alessandro VARIOLA	Telephone	331 64 46 83 00
Telecopy	331 64 46 83 62	E-mail	variola@lal.in2p3.fr
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FCF	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2008	To	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	1 015 120,79	0,00		0,00	3 000,00	0,00	1 495,43						**1 019 616,22**	**0,00**
Of which subcontracting														
Indirect costs	203 024,16	0,00		0,00	600,00	0,00	299,09	0,00				0,00	**203 923,25**	**0,00**
Adjustments to previous period(s)	271,95												**271,95**	
Total costs	1 218 416,90	0,00		0,00	3 600,00	0,00	1 794,52	0,00		0,00		0,00	**1 223 811,42**	**0,00**

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	614 602,97

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Agence Comptable Secondaire de PMA**	**Cost of the certificate**	3 000,00
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	3000,00

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	M. Alessandro VARIOLA	**M. Gilles SENTISE**
	Date	**Date**
	26/03/2009	**26/03/2009**
	Signature	**Signature**

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395

Contractors's legal name	Centre National de la Recherche Scientifique- CNRS		
Legal Type	GOV		
Contact Person	M. Alessandro VARIOLA	Telephone	331 64 46 83 00
Telecopy	331 64 46 83 62	E-mail	variola@lal.in2p3.fr

Cost model used (AC/FC or FCF)/ (UF : User Fee)(*)	FCF	Indirect costs (Real or Flat Rate	20%

Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex 1 of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

III of the contract.

	Type of Activity													
	Technological (A)		Demonstration (B)		the Consortium (C)		Activities: (D)		Activities: (E)		Specific (E)		(A)+(B)+(C)+	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs		3 771,52	0,00	0,00		0,00	0,00	8 851,40	0,00	0,00	0,00	0,00	0,00	12 622,92
Of which subcontracting														
Indirect costs	0,00	754,30	0,00	0,00	0,00	0,00	0,00	1 770,28	0,00	0,00	0,00	0,00	0,00	2 524,58
Adjustments to previous period(s)													0,00	
Total costs	0,00	4 525,82	0,00	0,00	0,00	0,00	0,00	10 621,68	0,00	0,00	0,00	0,00	0,00	15 147,50

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Technological (A)		Demonstration (B)		the Consortium (C)		Activities: (D)		Activities: (E)		Activities (E)		(A)+(B)+(C)+	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	12 884,59

6- Audit certificates			
delivered by independent auditor(s)? (Yes / No)			YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Agence Comptable**	**Cost of the certificate**	0
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	0
Reminders:			
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit			

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;

Statement ;
- the above information declared is complete and true ;

in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Alessandro VARIOLA	
	Date	**Date**
	Signature	**Signature**

4 GSI

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Gesellschaft für Schwerionenforschung mbH		
Legal Type	PNP		
Contact Person	Dr. Lars Groening	Telephone	+ 49 6159 712344
Telecopy	+49 6159 712991	E-mail	la.groening@gsi.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC/UF	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	REAL
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	236 921,61	0	0	0	1 238,20	0	2 619,21	0	0	0	0	0	240 779,02	
Of which subcontracting														
Indirect costs	34 158,79	0	0	0		0	0,00	0	0	0	0		34 158,79	
Adjustments to previous period(s)													0,00	
Total costs	271 080,40	0,00	0,00	0,00	1 238,20	0,00	2 619,21	0,00	0,00	0,00	0,00	0,00	274 937,81	*

* Total w/o audit costs: 273.699,61

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	139 397,61

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			YES
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Internal Audit**	**Cost of the certificate**	1238,2
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Dr. Lars Gröning	**Dr. Johannes Heilmann**
	Date	**Date**
	Signature	**Signature**

5 IAP-FU

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Johann Wolfgang Goethe Universität Frankfurt am Main		
Legal Type	Public research body organized under the laws of Germany		
Contact Person	Christoph Denecke	Telephone	+ 49 69 798 29547
Telecopy	+ 49 69 798 29546	E-mail	Denecke@ltg.uni-frankfurt.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	1.01.2008	TO	31.12.2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	77 217,64				1 959,76								79 177,40	
Of which subcontracting														
Indirect costs	15 443,53												15 443,53	
Adjustments to previous period(s)														
Total costs	92 661,17				1 959,76								94 620,93	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	94620,93

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			YES
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	1.01.2008 - 31.12.2008	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Interne Revision - Frankf. Univ.**	**Cost of the certificate**	718,96
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	U. Ratzinger	**C. Denecke**
	Date	**Date**
	19.02.2009	**20.02.2009**
	Signature	**Signature**

6 DESY

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Stiftung Deutsches Elektronen-Synchrotron		
Legal Type			
Contact Person	Prof. Dr. Dieter Proch	Telephone	(+49)-40-8998-3273
Telecopy	(+49)-40-8998-4302	E-mail	dieter.proch@desy.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat rate 20%
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	95 075,96				1079,5		3 994,54						100 150,00	
Of which subcontracting														
Indirect costs	19 015,19						798,91						19 814,10	
Adjustments to previous period(s)	2 283,15				1 605,43		2 111,69						6 000,27	
Total costs	116 374,30				2 684,93		6 905,14						125 964,37	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	125 964

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			Yes
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
Audit certificate of the contractor (X)			
Legal name of the audit firm	DESY Internal Auditor	**Cost of the certificate**	1 079,50
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	
Reminders: *The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement*			

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;

and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Prof. Dr. Dieter Proch	**Uwe Wolframm**
	Date	**Date**
	23-févr-09	**23-févr-09**
	Signature	**Signature**

7-FZJ

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action *(if necessary)*	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Forschungszentrum Juelich GmbH		
Legal Type	GmbH		
Contact Person	Dr. Raimund Tölle	Telephone	+49-2461-615615
Telecopy	+49-2461-612670	E-mail	r.toelle@fz-juelich.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	01/01/2008	To	31/12/2008

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)					No
If Yes, please provide the following information					
Third Party 1 (Y1)	Legal name		Cost model used		
Third Party 2 (Y2)	Legal name		Cost model used		
Third Party 3 (Y3)	Legal name		Cost model used		
Third Party 4 (Y4)	Legal name		Cost model used		

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indica

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	172 752,05				3 400,00		9 820,45						185 972,50	0,00
Of which subcontracting	0,00				3 400,00								3 400,00	0,00
Indirect costs	115 905,33						0,00						115 905,33	0,00
Adjustments to previous period(s)	-1 328,99						0,00						-1 328,99	0,00
Total costs	287 328,39	0,00	0,00	0,00	3 400,00	0,00	9 820,45	0,00	0,00	0,00	0,00	0,00	300 548,84	0,00

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**71 838,65**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			Yes
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Ernst & Young**	**Cost of the certificate**	1200
v			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	1200
Reminders: *The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement*			

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	Yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Dr. Raimund Tölle	**i.A. Jutta Stier i.A. Ruth Henschke**
	Date	**Date**
	Signature	**Signature**

8 TUM

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII-CT-2003-506395
Contractors's legal name	Technical University of München		
Legal Type			
Contact Person	Manfred Lindner	Telephone	+49 89 289 12350
Telecopy	(49) 89 289 14583	E-mail	lindner@ph.tum.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							2 525,62						2 525,62	
Of which subcontracting														
Indirect costs							505,12						505,12	
Adjustments to previous period(s)														
Total costs							3 030,74						3 030,74	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	**3 030,74**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Prof. Dr. Manfred Lindner	**A. Baur**
	Date	**Date**
	01/01/2009	**01/01/2009**
	Signature	**Signature**

9 FZR

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Forschungszentrum Dresden-Rossendorf e.V.		
Legal Type	Private public non-commercial		
Contact Person	Dr. Jochen Teichert	Telephone	0049 351 260 3445
Telecopy	0049 351 260 3690	E-mail	j.teichert@fzd.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	4 400,09				740,00								5 140,09	
Of which subcontracting	0,00				740,00								740,00	
Indirect costs	880,02				0,00								880,02	
Adjustments to previous period(s)	4 886,32				0,00								4886,32	
Total costs	10 166,43				740,00								10 906,43	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	10 906,43

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		Yes
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	

Audit certificate of the contractor (X)			
Legal name of the audit firm	PricewaterhouseCoopers AG Dresden	**Cost of the certificate**	500,00 € (+ 95,00 € VAT)
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	500,00 € (+ 95,00 € VAT)
Reminders: *The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement*			

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Dr. Jochen Teichert	Dr. Rainer Maletti
	Date	**Date**
	12/01/2009	12/01/2009
	Signature	**Signature**

10 INFN

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Istituto Nazionale di Fisica Nucleare		
Legal Type	GOV		
Contact Person	Maria Teresa Ghirelli	Telephone	+39 6 94032237
Telecopy	+39 6 94032630	E-mail	ghirelli@lnf.infn.it
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No) **NO**

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	312 314,96				6 482,08		15 150,44						333 947,48	
Of which subcontracting	25 806,50				6 482,08		0,00						32 288,58	
Indirect costs	57 301,39				0,00		3 030,39						60 331,78	
Adjustments to previous period(s) + indirect costs	1 370,17				0,00		0,00						1 370,17	
Total costs	370 986,52				6 482,08		18 180,83						395 649,43	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**395 649,43**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**Yes**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	Dr. Ugo Braico	**Cost of the certificate**	2 505,03
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	
Reminders:			
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement			

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	Yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Susanna Guiducci	**Maria Teresa Ghirelli**
	Date	**Date**
	Signature	**Signature**

11 TEU

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395

Contractors's legal name	UNIVERSITY OF TECHNOLOGY TWENTE		
Legal Type	GOVERNMENTAL		
Contact Person	M. Eertink	Telephone	31534893657
Telecopy	+31 53 4894841	E-mail	g.m.eertink@utwente.nl

Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real

Period from	January 1st. 2008	TO	December 31st. 2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1	Legal name		Cost model used	
Third Party 2	Legal name		Cost model used	
Third Party 3	Legal name		Cost model used	
Third Party 4	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	69 061,58						4 985,00						74 046,58	
subcontracting							4 985,00						4 985,00	
Indirect costs	36 334,10												36 334,10	
Adjustments to previous period(s)	1 127,87												1 127,87	
Total costs	106 523,55						4 985,00						111 508,55	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	**56878,50**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**yes**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			**yes**
If No, what are the periods covered by this(those) audit certificate(s) ?		From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Ten Kate & Huizinga Accountants B.V**	**Cost of the certificate**	**3000,00**
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	**3000,00**

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**No**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	ir. A. den Ouden	**A. Groenink**
	Date	**Date**
	2-feb-09	**2-feb-09**
	Signature	**Signature**

12 TUL

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	TECHNICAL UNIVERSITY OF LODZ, POLAND		
Legal Type	TECHNICAL UNIVERSITY		
Contact Person	Mariusz Grecki	Telephone	48-42-631-26-28
Telecopy	042-636-03-27	E-mail	grecki@dmcs.p.lodz.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	0,00	0	0	0		0	0,00	0	0	0	0	0	0,00	
Of which subcontracting														
Indirect costs	0,00	0	0	0		0	0,00	0	0	0	0		0,00	
Adjustments to previous period(s)													0,00	
Total costs	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	0,00

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			no
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	no
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	yes
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	prof. Andrzej Napieralski	**Jadwiga Machnicka**
	Date	**Date**
	24.02.2009	**24.02.2009**
	Signature	**Signature**

13 IPJ

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	The Andrzej Soltan Institute for Nuclear Studies		
Legal Type	gov		
Contact Person	Marek Sadowski	Telephone	48227180536
Telecopy	48227793481	E-mail	msadowski@ipj.gov.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	January 1st 2008	To	December 31 2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	0,00				0,00		0,00						0,00	
Of which subcontracting														
Indirect costs	0,00						0,00						0,00	
Adjustments to previous period(s)														
Total costs	0,00				0,00		0,00						0,00	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	0,00

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**NO**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Marek Sadowski	**Jadwiga Trzaskowska**
	Date	**Date**
	January 6 2009	**January 6 2009**
	Signature	**Signature**

14 WUT-ISE

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Politechnika Warszawska		
Legal Type	Governmental		
Contact Person	Ryszard Romaniuk	Telephone	48226607738
Telecopy	48228252300	E-mail	rrom@ise.pw.edu.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)		Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flate rate 20%
Period from	1st of January 2008	TO	31st of December 2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	0,00	0	0	0		0	0,00	0	0	0	0	0	0,00	
Of which subcontracting														
Indirect costs	0,00	0	0	0		0	0,00	0	0	0	0		0,00	
Adjustments to previous period(s)													0,00	
Total costs	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	**0,00**

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		No
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	-	**Cost of the certificate**	-
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) +**	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Ryszard Romaniuk	**Jadwiga Bajkowska**
	Date	**Date**
	08.01.2009	**08.01.2008**
	Signature	**Signature**

15 WUT

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action *(if necessary)*	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	WROCLAW UNIVERSITY OF TECHNOLOGY		
Legal Type			
Contact Person	Maciej CHOROWSKI	Telephone	+48 71 320 23 25
Telecopy	+48 71 320 42 28	E-mail	maciej.chorowski@pwr.wroc.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20% of Direct costs, except subcontracting
Period from	January 1st 2008	To	December 31 2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No) — **No**

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	4377,62				1200,83		67,64						5646,09	
Of which subcontracting					1200,83								1200,83	
Indirect costs	875,52				0,00		13,53						889,05	
Adjustments to previous period(s)													0,00	
Total costs	5253,14				1200,83		81,17						6535,14	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	6 535,14

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	Jan 01 2004 - Dec 31 2008
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ? 1200,83		

Audit certificate of the contractor (X)			
Legal name of the audit firm	AUDYTOR	**Cost of the certificate**	1200,83
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Maciej Chorowski	**Alicja Maniak**
	Date	**Date**
	Signature	**Signature**

16 CSIC

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Consejo Superior de Investigaciones Científicas		
Legal Type			
Contact Person	Angeles Faus-Golfe	Telephone	34 963543545
Telecopy	34 963543488	E-mail	Angeles.Faus-Golfe@uv.es
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	1 January 2008	TO	31 December 2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs					1050,00		1258,17						2308,17	
Of which subcontracting					1050,00								1050,00	
Indirect costs							251,63						251,63	
Adjustments to previous period(s)							7871,39						7871,39	
Total costs					1050,00		9381,19						10431,19	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	10431,19

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			NO
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		01/01/05 a 31/12/08
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?	*1218 (including VAT)*		

Audit certificate of the contractor (X)			
Legal name of the audit firm	Audhispana Grant Thornton	**Cost of the certificate**	1218 (including VAT)
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	1218

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	YES
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Angeles Faus-Golfe	Carlos Manuel Abad Ruiz
	Date	**Date**
	20 January 2009	
	Signature	**Signature**

17 CERN

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives
(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	European Organisation for Nuclear Research		
Legal Type	GOV		
Contact Person	Jean-Pierre Koutchouk	Telephone	+41-22-767 3230
Telecopy	+41-22-767 6300	E-mail	jean-pierre.koutchouk@cern.ch
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20%
Period from	01-janv-08	TO	31-déc-08

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name	N/A	Cost model used	
Third Party 2 (Y2)	Legal name	N/A	Cost model used	
Third Party 3 (Y3)	Legal name	N/A	Cost model used	
Third Party 4 (Y4)	Legal name	N/A	Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indica

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	498 119,70	N/A	N/A	N/A	N/A	N/A	32 235,71	N/A	N/A	N/A	N/A	N/A	530 355,41	N/A
Of which subcontracting	323 371,44	N/A	N/A	N/A	N/A	N/A	0,00	N/A	N/A	N/A	N/A	N/A	323 371,44	N/A
Indirect costs	34 949,65	N/A	N/A	N/A	N/A	N/A	6 447,14	N/A	N/A	N/A	N/A	N/A	41 396,79	N/A
Adjustments to previous period(s)		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	0,00	N/A
Total costs	533 069,35	N/A	N/A	N/A	N/A	N/A	38 682,85	N/A	N/A	N/A	N/A	N/A	571 752,20	N/A

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													N/A	N/A

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	**N/A**
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**571 752,20**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**Yes**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			**Yes**
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?	**NIL**		

Audit certificate of the contractor (X)			
Legal name of the audit firm	**N/A**	**Cost of the certificate**	**NIL**
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm	**N/A**	**Cost of the certificate**	**N/A**
Y2 : Legal name of the audit firm	**N/A**	**Cost of the certificate**	**N/A**
Y3 : Legal name of the audit firm	**N/A**	**Cost of the certificate**	**N/A**
Y4 : Legal name of the audit firm	**N/A**	**Cost of the certificate**	**N/A**
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Euro 1 = 1.4874 CHF

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**NO**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**YES**
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**N/A**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Jean-Pierre KOUTCHOUK	**Florian SONNEMANN**
	Date	**Date**
	April 6, 2009	**April 6, 2009**
	Signature	**Signature**

18 UNI-GE

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	University of Geneva		
Legal Type			
Contact Person	Alain Blondel	Telephone	00 41 22 379 6227
Telecopy	41223796992	E-mail	alain.blondel@cern.ch
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	
Period from	01.01.2008	TO	31.12.2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs					1 730,40 €		495,60 €						2 226,00 €	
Of which subcontracting					1 730,40 €									
Indirect costs							322,90 €						322,90 €	
Adjustments to previous period(s)														
Total costs					1 730,40 €		818,50 €						2 548,90 €	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	0 €

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		no
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		no
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	01.01.2004 - 31.12.2008
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	1730,4
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	1730,4

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts. 1€ = 1.6058 CHF

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	NO
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	YES
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Alain Blondel	**Henri WACONGNE**
	Date	**Date**
	31-mars-09	**07-avr-09**
	Signature	**Signature**
		

19 PSI

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Paul Scherrer Institute (PSI)		
Legal Type			
Contact Person	Volker Schlott	Telephone	00 41 56 310 4237
Telecopy	0041 56 310 4528	E-mail	volker.schlott@psi.ch
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	01. Jan 08	TO	31. Dez 08

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	120 134,92												120 134,92	
Of which subcontracting														
Indirect costs	23 788,96												23 788,96	
Adjustments to previous period(s)														
Total costs	143 923,88						0,00						**143 923,88**	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	0 €

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**No**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	
Reminders: *The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement*			

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**No**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**Yes**
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Volker Schlott	**Isabelle Stutz**
	Date	**Date**
	20. Jan 09	**20. Jan 09**
	Signature	**Signature**

20 STFC

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Science and Technology Facilities Council		
Legal Type	Non-Profit		
Contact Person	Mrs Anna Kalinina	Telephone	+44 1235 446908
Telecopy		E-mail	Anna.Kalinina@stfc.ac.uk
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	01/01/2008	TO	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	166 908,97	0	0	0		0	5 492,92	0	0	0	0	0	172 401,89	
Of which subcontracting														
Indirect costs	152 358,33	0	0	0		0	0,00	0	0	0	0		152 358,33	
Adjustments to previous period(s)													0,00	
Total costs	319 267,30	0,00	0,00	0,00	0,00	0,00	5 492,92	0,00	0,00	0,00	0,00	0,00	324 760,22	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	**€ 85 309,75**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			YES
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		***€ 650***	

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) +**	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**Yes E/R 0.961**
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Dr TR Edgecock	**Mrs A Kalinina**
	Date	**Date**
	26/02/2009	**26/02/2009**
	Signature	**Signature**

21 ICL

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures
(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	**Type of Action** *(if necessary)*	N.A.
Project Title (or Acronym)	**CARE**	**Contract n°**	**RII3-CT-2003-506395**

Contractor's Legal Name	**Imperial College of Science, Technology and Medicine**		
Legal Type	Non profit		
Contact Person	Brooke Alasya	**Telephone**	+44 (0)207 5941181
Telecopy	+44 (0)207 5941418	**E-mail**	b.alasya@imperial.ac.uk

Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	**Indirect costs** (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20% of Direct Costs, except subcontracting

Period from	01 January 2008	**To**	31 December 2008

(*) If UF is used under "other specific activities: transnational access", please mention the two costs models used (eg: FC/UF or FCF/UF or AC/UF)

1 - Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No
If Yes, please provide the following information	

Third party 1 (Y1)	**Legal Name**		**Cost model used**	
Third party 2 (Y2)	**Legal Name**		**Cost model used**	
Third party 3 (Y3)	**Legal Name**		**Cost model used**	
Third party 4 (Y4)	**Legal Name**		**Cost model used**	

If necessary add another Form C.

2 - Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs.
The costs declared should distinguish between direct and indirect costs.
If necessary, adjustments to previous period(s) may be included where appropriate.

	Type of Activity												Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access /Connectivity (E)		Other Specific Activities (F)			
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs					1 555,67		385,45						1 941,12	0,00
Of which subcontracting					1 555,67								1 555,67	0,00
Indirect costs							77,09						77,09	0,00
Adjustments to previous period(s)							-2 770,14						-2 770,14	0,00
Total costs	0,00	0,00	0,00	0,00	1 555,67	0,00	-2 307,60	0,00	0,00	0,00	0,00	0,00	-751,93	0,00

3 - Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity												Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Research and Technological Development / Innovation (A')		Demonstration (B')		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access /Connectivity (E)		Other Specific Activities (F)			
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0,00	0,00

4 - Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest (Yes / No)	
If yes, please indicate the amount (in €)	

5 - Request of FP6 Financial contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €).	-751,93

6 - Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			No
If No, what are the periods covered by this(those) audit certificate(s)?	**From - To**		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s)?			
Audit certificate of the contractor (X)			
Legal name of the audit firm	KPMG LLP	**Cost of the certificate**	1 555,67
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary, add another Form C.		**Total (Z) = (X) + (Ys)**	1 555,67

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".
The required audit certificate(s) is(are) attached to this Financial Statement.

7 - Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) - Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third party(ies) *(if necessary)*	
Third party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another form C.

8 - Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Professor Ken Long	Ms Brooke Alasya
	Date	**Date**
	04-Feb-09	04-Feb-09
	Signature	**Signature**

22 UMA

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives
(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action *(if necessary)*	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395/DGRes/F
Contractors's legal name	The University Of Manchester		
Legal Type			
Contact Person	Elias Mungwala	Telephone	+44(0)161 275 54109
Telecopy	+44(0)161 275 54109	E-mail	elias.mungwala@manchester.ac.uk
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20%
Period from	01/01/2008	To	31/12/2008

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs					600,00		4 222,47						4 822,47	
Of which subcontracting														
Indirect costs							844,49						844,49	
Adjustments to previous period(s)														
Total costs	0,00				600,00		5 066,96		0,00		0,00		5 666,96	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**5 666,96**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**YES**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			**YES**
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**UNIAC**	**Cost of the certificate**	€ 600,00
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**Yes**
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Prof. Roger Barlow	**Elias Mungwala**
	Date	**Date**
	27/01/2009	**27/01/2009**
	Signature	**Signature**

3. Summary financial report

Summary financial report (Appendix 3).

Summary Financial Report

Type of Instrument	I3	Project Title (or Acronym)	CARE	Contract N°	RII3-CT-2003-506395
Reporting period number	5	From (dd/mm/yyyy)	01/01/2008	To (dd/mm/yyyy)	31/12/2008	Page	1/1

Contractor n°	Organisation Short Name	Cost model(s) used: For Transnational Access	Cost model(s) used: For any other activities	Eligible costs (in €)	Type of activities: Research and Technological Development / Innovation (A)			Demonstration (B)			Management of the consortium (C)			Other Specific Activities: Coordination (D)			Other Specific Activities: Transnational Access (E)			Other Specific Activities (F)			Total eligible costs (G)=(A)+(B)+(C)+(D)+(E)+(F)			Receipts		
					Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	UF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)
1	CEA		FC	Direct eligible costs	671 350,13						87 735,40			10 073,34									769158,87	0,00	0,00			
				of which direct eligible costs of subcontracting							8 500,00												*8500,00*	*0,00*	*0,00*			
				Indirect eligible costs	217 600,52						48 474,53			0,00									266075,05	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*888 950,65*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*136 209,93*	*0,00*	*0,00*	*10 073,34*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	1035233,92	0,00	0,00			
2	UCLN		AC	Direct eligible costs							400			317,94									717,94	0,00	0,00			
				of which direct eligible costs of subcontracting							400												*400,00*	*0,00*	*0,00*			
				Indirect eligible costs										63,59									63,59	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*400,00*	*0,00*	*0,00*	*381,53*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	781,53	0,00	0,00			
3	CNRS		FCF	Direct eligible costs	1 015 120,79		3 771,52				3 000,00			1 495,43		8 851,40							1019616,22	0,00	12 622,92			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	203 024,18		754,30				600,00			299,09		1 770,28							203923,25	0,00	2 524,58			
				Adjustment on previous period(s)	271,95																		271,95	0,00	0,00			
				Total eligible costs	*1 218 416,90*	*0,00*	*4 525,82*	*0,00*	*0,00*	*0,00*	*3 600,00*	*0,00*	*0,00*	*1 794,52*	*0,00*	*10 621,68*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	1223811,42	0,00	15 147,50			
4	GSI		FC	Direct eligible costs	236 921,61						1 238,20			2 619,21									240779,02	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	34 158,79									0,00									34158,79	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*271 080,40*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*1 238,20*	*0,00*	*0,00*	*2 619,21*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	274937,81	0,00	0,00			
5	IAP-FU		AC	Direct eligible costs	77217,64						1959,76												79177,40	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	15443,53																		15443,53	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*92 661,17*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*1 959,76*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	94620,93	0,00	0,00			
6	DESY		AC	Direct eligible costs	95 075,96						1079,5			3 994,54									100150,00	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	19 015,19									798,91									19814,10	0,00	0,00			
				Adjustment on previous period(s)	2 283,15						1 605,43			2 111,69									6000,27	0,00	0,00			
				Total eligible costs	*116 374,30*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*2 684,93*	*0,00*	*0,00*	*6 905,14*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	125964,37	0,00	0,00			
7	FZJ		FC	Direct eligible costs	172 752,05						3 400,00			9 820,45									185972,50	0,00	0,00			
				of which direct eligible costs of subcontracting	0,00						3 400,00												*3400,00*	*0,00*	*0,00*			
				Indirect eligible costs	115 905,33									0,00									115905,33	0,00	0,00			
				Adjustment on previous period(s)	-1 328,99									0,00									-1328,99	0,00	0,00			
				Total eligible costs	*287 328,39*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*3 400,00*	*0,00*	*0,00*	*9 820,45*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	300548,84	0,00	0,00			

8	TUM		AC	Direct eligible costs										2 525,62									2525,62	0,00	0,00			
				of which direct eligible costs of subcontracting																			0,00	0,00	0,00			
				Indirect eligible costs										505,12									505,12	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3 030,74	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3030,74	0,00	0,00			
9	FZR		AC	Direct eligible costs	4 400,09						740,00												5140,09	0,00	0,00			
				of which direct eligible costs of subcontracting	0,00						740,00												740,00	0,00	0,00			
				Indirect eligible costs	880,02						0,00												880,02	0,00	0,00			
				Adjustment on previous period(s)	4 886,32						0,00												4886,32	0,00	0,00			
				Total eligible costs	10 166,43	0,00	0,00	0,00	0,00	0,00	740,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10906,43	0,00	0,00			
10	INFN		AC	Direct eligible costs	312 314,96						6 482,08			15 150,44									333947,48	0,00	0,00			
				of which direct eligible costs of subcontracting	25 806,50						6 482,08			0,00									32288,58	0,00	0,00			
				Indirect eligible costs	57 301,39						0,00			3 030,39									60331,78	0,00	0,00			
				Adjustment on previous period(s)	1 370,17						0,00			0,00									1370,17	0,00	0,00			
				Total eligible costs	370 986,52	0,00	0,00	0,00	0,00	0,00	6 482,08	0,00	0,00	18 180,83	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	395649,43	0,00	0,00			
11	TEU		FC	Direct eligible costs	69 061,58						4 985,00												74046,58	0,00	0,00			
				of which direct eligible costs of subcontracting							4 985,00												4985,00	0,00	0,00			
				Indirect eligible costs	36 334,10																		36334,10	0,00	0,00			
				Adjustment on previous period(s)	1 127,87																		1127,87	0,00	0,00			
				Total eligible costs	106 523,55	0,00	0,00	0,00	0,00	0,00	4 985,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	111508,55	0,00	0,00			
12	TUL		AC	Direct eligible costs																			0,00	0,00	0,00			
				of which direct eligible costs of subcontracting																			0,00	0,00	0,00			
				Indirect eligible costs																			0,00	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00			
13	IPJ		AC	Direct eligible costs	0,00						0,00			0,00									0,00	0,00	0,00			
				of which direct eligible costs of subcontracting																			0,00	0,00	0,00			
				Indirect eligible costs	0,00																		0,00	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00			
14	WUT_ISE		AC	Direct eligible costs	0,00						0,00			0,00									0,00	0,00	0,00			
				of which direct eligible costs of subcontracting																			0,00	0,00	0,00			
				Indirect eligible costs	0,00																		0,00	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00			
15	WUT		AC	Direct eligible costs	4377,62						1200,83			67,64									5646,09	0,00	0,00			
				of which direct eligible costs of subcontracting							1200,83												1200,83	0,00	0,00			
				Indirect eligible costs	875,52						0,00			13,53									889,05	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	5 253,14	0,00	0,00	0,00	0,00	0,00	1 200,83	0,00	0,00	81,17	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6535,14	0,00	0,00			
16	CSIC		FC	Direct eligible costs							1050			1258,17									2308,17	0,00	0,00			
				of which direct eligible costs of subcontracting							1050												1050,00	0,00	0,00			
				Indirect eligible costs										251,63									251,63	0,00	0,00			
				Adjustment on previous period(s)										7871,39									7871,39	0,00	0,00			
				Total eligible costs	0,00	0,00	0,00	0,00	0,00	0,00	1 050,00	0,00	0,00	9 381,19	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10431,19	0,00	0,00			

17	CERN		AC	Direct eligible costs	498 119,70									32 235,71									530355,41	0,00	0,00			
				of which direct eligible costs of subcontracting	323 371,44									0,00									*323371,44*	*0,00*	*0,00*			
				Indirect eligible costs	34 949,65									6 447,14									41396,79	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*533 069,35*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*38 682,85*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	571752,20	0,00	0,00			
18	UNIGE		AC	Direct eligible costs							1 730,40 €			495,60 €									2226,00	0,00	0,00			
				of which direct eligible costs of subcontracting							1 730,40 €												*1730,40*	*0,00*	*0,00*			
				Indirect eligible costs										322,90 €									322,90	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*1 730,40*	*0,00*	*0,00*	*818,50*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	2548,90	0,00	0,00			
19	PSI		FC	Direct eligible costs	120 134,92																		120134,92	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	23 788,96																		23788,96	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*143 923,88*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	143923,88	0,00	0,00			
20	STFC		FC	Direct eligible costs	166 908,97						0,00			5 492,92									172401,89	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	152 358,33																		152358,33	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*319 267,30*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*5 492,92*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	324760,22	0,00	0,00			
21	ICL		AC	Direct eligible costs							1 555,67			385,45									1941,12	0,00	0,00			
				of which direct eligible costs of subcontracting							1 555,67												*1555,67*	*0,00*	*0,00*			
				Indirect eligible costs										77,09									77,09	0,00	0,00			
				Adjustment on previous period(s)										-2 770,14									-2770,14	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*1 555,67*	*0,00*	*0,00*	*-2 307,60*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	-751,93	0,00	0,00			
22	UMA		AC	Direct eligible costs							600,00			4 222,47									4822,47	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs										844,49									844,49	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*600,00*	*0,00*	*0,00*	*5 066,96*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	5666,96	0,00	0,00			
Total eligible costs					4 364 001,99	0,00	4 525,82	0,00	0,00	0,00	167 836,80	0,00	0,00	110 021,74	0,00	10 621,68	0,00	0,00	0,00	0,00	0,00	0,00	4641860,53	0,00	15 147,50	0,00	0,00	0,00
							4 368 527,81			0,00			167 836,80			120 643,42			0,00			0,00			4 657 008,03			0,00
Requested EC contribution for the reporting period (in €) without taking into account receipts																							2 705 499,06				
							0,00			0,00			0,00			0,00			0,00			0,00						
Requested EC contribution for the reporting period (in €) taking into account receipts [=Periodic Invoice]																							2 705 499,06				
Amount of the financial interests generated by the prefinancing																											

C. REPORT ON THE DISTRIBUTION OF THE COMMUNITY FINANCIAL CONTRIBUTION

Report on the distribution between contractors made during the reporting period of the Community financial contribution

Report on the Distribution of the Community's contribution

Type of Instrument	I3	Project Title (or Acronym)	CARE	Contract N°	RII3-CT-2003-506395

Part I — Community's prefinancing (or payment) sent to the coordinator (1)

	Reporting Period 1 (2)		Reporting Period 2 (2)		Reporting Period 3 (2)		Reporting Period 4 (2)		Reporting Period 5 (2)		Reporting Period 6 (2)		Reporting Period 7 (2)		Final payment		Total Amount (I) (3)
	From EC	To CEA	From EC	To CEA	From EC	To CEA	From EC	To CEA	From	To	From	To	From	To			
	Date	Amount (A)	Date	Amount (B)	Date	Amount (C)	Date	Amount (D)	Date	Amount (E)	Date	Amount (F)	Date	Amount (G)	Date	Amount (H)	
Total (X)	15/03/2004	5 235 000,00	24/06/2005	4 927 837,00	19/07/2006	2 605 444,45	30/07/2007	1 144 318,16	28/07/2008	564 444,17							15 058 888,96
							23/10/2007	107 262,25	26/08/2008	474 582,93							

Part II — Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) (4)

Contractor n°	Organisation Short Name	Country Code	Reporting Period 1		Reporting Period 2		Reporting Period 3		Reporting Period 4		Reporting Period 5		Reporting Period 6		Reporting Period 7		Final payment		Total Amount (I') (6)
			Date(s) (5)	Amount(s) (A') (5)	Date(s) (5)	Amount(s) (B') (5)	Date(s) (5)	Amount(s) (C') (5)	Date(s) (5)	Amount(s) (D') (5)	Date(s) (5)	Amount(s) (E') (5)	Date(s) (5)	Amount(s) (F') (5)	Date(s) (5)	Amount(s) (G') (5)	Date(s) (5)	Amount(s) (H') (5)	
1	CEA	F	9/04/2004	653 490,00 €	24/06/2005	1 253 107,00	21/07/2006	105 444,45	6/08/2007	148 118,16	2/09/2008	153 699,10							2 313 858,71 €
									6/11/2007	416,25									416,25 €
																			0,00 €
																			0,00 €
			Total	653 490,00 €	Total	1 253 107,00	Total	105 444,45	Total	148 534,41	Total	153 699,10	Total	0,00	Total	0,00	Total	0,00	2 314 274,96 €
2	UCLN	B	19/04/02004	1 425,00 €	1/07/2005	1 200,00	21/07/2006	2 000,00	6/08/2007	1 200,00	2/09/2008	375,00							6 200,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	1 425,00 €	Total	1 200,00	Total	2 000,00	Total	1 200,00	Total	375,00	Total	0,00	Total	0,00	Total	0,00	6 200,00 €
3	CNRS	F	30/04/2004	831 242,00 €	1/07/2005	746 540,00	21/07/2006	350 000,00	6/08/2007	140 000,00	2/09/2008	120 000,00							2 187 782,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	831 242,00 €	Total	746 540,00	Total	350 000,00	Total	140 000,00	Total	120 000,00	Total	0,00	Total	0,00	Total	0,00	2 187 782,00 €
4	GSI	D	19/04/2004	133 554,00 €	1/05/2005	167 860,00	21/07/2006	50 000,00	6/08/2007	20 000,00	2/09/2008	18 386,00							389 800,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	133 554,00 €	Total	167 860,00	Total	50 000,00	Total	20 000,00	Total	18 386,00	Total	0,00	Total	0,00	Total	0,00	389 800,00 €
5	IAP-FU	D	3/05/2004	108 732,00 €	1/07/2005	137 110,00	21/07/2006	120 000,00	6/08/2007	30 000,00	2/09/2008	24 158,00							420 000,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	108 732,00 €	Total	137 110,00	Total	120 000,00	Total	30 000,00	Total	24 158,00	Total	0,00	Total	0,00	Total	0,00	420 000,00 €
6	DESY	D	19/04/2004	638 912,00 €	1/07/2005	234 790,00	21/07/2006	500 000,00	6/08/2007	160 000,00	2/09/2008	160 000,00							1 693 702,00 €
									6/11/2007	79 000,00									79 000,00 €
																			0,00 €
																			0,00 €
			Total	638 912,00 €	Total	234 790,00	Total	500 000,00	Total	239 000,00	Total	160 000,00	Total	0,00	Total	0,00	Total	0,00	1 772 702,00 €
7	FZJ	D	22/04/2004	124 405,00 €	1/07/2005	214 400,00	21/07/2006	170 000,00	6/08/2007	40 000,00	2/09/2008	17 195,00							566 000,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	124 405,00 €	Total	214 400,00	Total	170 000,00	Total	40 000,00	Total	17 195,00	Total	0,00	Total	0,00	Total	0,00	566 000,00 €
8	TUM	D	30/04/2004	2 325,00 €	1/07/2005	1 050,00	21/07/2006	3 000,00	6/08/2007	2 000,00	2/09/2008	1 925,00							10 300,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	2 325,00 €	Total	1 050,00	Total	3 000,00	Total	2 000,00	Total	1 925,00	Total	0,00	Total	0,00	Total	0,00	10 300,00 €
9	FZR-ELBE	D	19/04/2004	147 726,00 €	1/07/2005	109 740,00	21/07/2006	105 000,00	6/08/2007	25 000,00	2/09/2008	14 534,00							402 000,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	147 726,00 €	Total	109 740,00	Total	105 000,00	Total	25 000,00	Total	14 534,00	Total	0,00	Total	0,00	Total	0,00	402 000,00 €
10	INFN	I	19/04/2004	780 160,00 €	1/07/2005	345 570,00	21/07/2006	350 000,00	6/08/2007	300 000,00	2/09/2008	310 000,00							2 085 730,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	780 160,00 €	Total	345 570,00	Total	350 000,00	Total	300 000,00	Total	310 000,00	Total	0,00	Total	0,00	Total	0,00	2 085 730,00 €

Page n° /	1	3

Report on the Distribution of the Community's contribution

Type of Instrument	I3	Project Title (or Acronym)	CARE	Contract N°	RII3-CT-2003-506395

Part II — Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) *(4)*

Contractor n°	Organisation Short Name	Country Code	Reporting Period 1		Reporting Period 2		Reporting Period 3		Reporting Period 4		Reporting Period 5		Reporting Period 6		Reporting Period 7		Final payment		Total Amount (I') *(6)*
			Date(s) *(5)*	Amount(s) (A') *(5)*	Date(s) *(5)*	Amount(s) (B') *(5)*	Date(s) *(5)*	Amount(s) (C') *(5)*	Date(s) *(5)*	Amount(s) (D') *(5)*	Date(s) *(5)*	Amount(s) (E') *(5)*	Date(s) *(5)*	Amount(s) (F') *(5)*	Date(s) *(5)*	Amount(s) (G') *(5)*	Date(s) *(5)*	Amount(s) (H') *(5)*	
11	TEU	PL	19/04/2004	111 545,00 €	1/07/2005	83 400,00	21/07/2006	40 000,00	6/08/2007	40 000,00	2/09/2008	25 555,00							300 500,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	111 545,00 €	Total	83 400,00	Total	40 000,00	Total	40 000,00	Total	25 555,00	Total	0,00	Total	0,00	Total	0,00	300 500,00 €
12	TUL Lodz	PL	20/04/2004	100 904,00 €	1/07/2005	61 250,00	21/07/2006	60 000,00	6/08/2007	30 000,00		0,00							252 154,00 €
									6/11/2007	10 846,00									10 846,00 €
																			0,00 €
																			0,00 €
			Total	100 904,00 €	Total	61 250,00	Total	60 000,00	Total	40 846,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	263 000,00 €
13	IPJ	PL	20/04/2004	93 885,00 €	1/07/2005	86 640,00	21/07/2006	30 000,00	6/08/2007	25 000,00		0,00							235 525,00 €
									6/11/2007	9 475,00									9 475,00 €
																			0,00 €
																			0,00 €
			Total	93 885,00 €	Total	86 640,00	Total	30 000,00	Total	34 475,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	245 000,00 €
14	PW (WUT-ISE)	PL	20/04/2004	146 526,00 €	1/07/2005	134 830,00	21/07/2006	80 000,00	6/08/2007	10 000,00		0,00							371 356,00 €
									6/11/2007	6 644,00									6 644,00 €
																			0,00 €
																			0,00 €
			Total	146 526,00 €	Total	134 830,00	Total	80 000,00	Total	16 644,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	378 000,00 €
15	WUT	PL	20/04/2004	40 119,00 €	1/07/2005	12 000,00	21/07/2006	5 000,00	6/08/2007	3 000,00									60 119,00 €
									6/11/2007	881,00									881,00 €
																			0,00 €
																			0,00 €
			Total	40 119,00 €	Total	12 000,00	Total	5 000,00	Total	3 881,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	61 000,00 €
16	CSIC	SP	30/04/2004	11 473,00 €	1/07/2005	11 670,00	21/07/2006	14 000,00	6/08/2007	10 000,00	2/09/2008	3 057,00							50 200,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	11 473,00 €	Total	11 670,00	Total	14 000,00	Total	10 000,00	Total	3 057,00	Total	0,00	Total	0,00	Total	0,00	50 200,00 €
17	CERN	CH	19/04/2004	1 069 328,00 €	1/07/2005	1 117 320,00	21/07/2006	400 000,00	6/08/2007	65 000,00	2/09/2008	103 652,00							2 755 300,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	1 069 328,00 €	Total	1 117 320,00	Total	400 000,00	Total	65 000,00	Total	103 652,00	Total	0,00	Total	0,00	Total	0,00	2 755 300,00 €
18	UNI-GE	CH		0,00		0,00		0,00		0,00		0,00							0,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	0,00 €	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	0,00 €
19	PSI	CH		0,00		0,00		0,00		0,00		0,00							0,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	0,00 €	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	0,00 €
20	STFC	GB	20/04/2004	209 029,00 €	1/07/2005	189 990,00	21/07/2006	180 000,00	6/08/2007	70 000,00	2/09/2008	73 781,00							722 800,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	209 029,00 €	Total	189 990,00	Total	180 000,00	Total	70 000,00	Total	73 781,00	Total	0,00	Total	0,00	Total	0,00	722 800,00 €
21	ICL	GB	30/04/2004	20 472,00 €	1/07/2005	11 820,00	21/07/2006	30 000,00	6/08/2007	18 000,00	2/09/2008	9 008,00							89 300,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	20 472,00 €	Total	11 820,00	Total	30 000,00	Total	18 000,00	Total	9 008,00	Total	0,00	Total	0,00	Total	0,00	89 300,00 €
22	UMA	GB	20/04/2004	9 748,00 €	1/07/2005	7 550,00	21/07/2006	11 000,00	6/08/2007	7 000,00	2/09/2008	3 702,00							39 000,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	9 748,00 €	Total	7 550,00	Total	11 000,00	Total	7 000,00	Total	3 702,00	Total	0,00	Total	0,00	Total	0,00	39 000,00 €

Page n° /	2	3

Report on the Distribution of the Community's contribution

Type of Instrument	I3	Project Title (or Acronym)	CARE	Contract N°	RII3-CT-2003-506395

Part II — Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) *(4)*

Contractor n°	Organisation Short Name	Country Code	Reporting Period 1		Reporting Period 2		Reporting Period 3		Reporting Period 4		Reporting Period 5		Reporting Period 6		Reporting Period 7		Final payment		Total Amount (I') *(6)*
			Date(s) *(5)*	Amount(s) (A') *(5)*	Date(s) *(5)*	Amount(s) (B') *(5)*	Date(s) *(5)*	Amount(s) (C') *(5)*	Date(s) *(5)*	Amount(s) (D') *(5)*	Date(s) *(5)*	Amount(s) (E') *(5)*	Date(s) *(5)*	Amount(s) (F') *(5)*	Date(s) *(5)*	Amount(s) (G') *(5)*	Date(s) *(5)*	Amount(s) (H') *(5)*	
23																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
24																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
25																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
26																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
27																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
28																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
29																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
30																			0,00
																			0,00
																			0,00
																			0,00
			Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	**0,00**
Total (Y)			Total	5 235 000,00 €	Total	4 927 837,00	Total	2 605 444,45	Total	1 251 580,41	Total	1 039 027,10	Total	0,00	Total	0,00	Total	0,00	**15 058 888,96 €**

Part III — Difference between Community's prefinancing (or payment) sent to the coordinator and Total Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) *(4)*

	Reporting Period 1	Reporting Period 2	Reporting Period 3	Reporting Period 4	Reporting Period 5	Reporting Period 6	Reporting Period 7	Final payment	Total Amount
Community's prefinancing (or payment) not yet distributed between contractors (Z) *(7)*	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	**0,00**

I certify that the information set out in this(these) form(s) is accurate and correct and agreed by all contractors.

Name *(8)*	Surname *(8)*	Date (dd/mm/yyyy)	Signature of the administrative official authorised to commit the organisation of the coordinator *(8)*
Aleksan	Roy	15/02/2008	

Explanatory notes

(1): To be filled in only by the Commission services.
(2): Established in conformity with articles 4.2 and 6 of the contract.
(3): (I) = (A) + (B) + (C) + (D) + (E) + (F) + (G) + (H)
(4): To be filled in only by the coordinator.
(5): Insert the dates (dd/mm/yyyy) and the amounts (x,xxx.xx €) transferred to a contractor (including the coordinator) for a reporting period. If there are more than one transfer to a contractor during a reporting period, identify each date and each relating transferred amount.
(6): (I') = (A') + (B') + (C') + (D') + (E') + (F') + (G') + (H')
(7): (Z) = (X) - (Y)
(8): One the following persons : authorised contact person or first or second administrative official authorised to sign the contract, as mentioned in your Contract Preparation Form (Form A2b)

Page n° /	3	3